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THE WAR ON PREDATORY ANIMALS

By PERCIVAL S. RIDSDALE

"HE was the biggest grizzly I ever saw. He reared up about fifty feet from me and kept coming. I pumped seven shots into him, the last one when he was so close that his blood spurted over me, and he fell dead at my feet." This is the modest statement of forest ranger Dwight L. Moody in describing the killing of the most famous grizzly known on the eastern slope of the Rockies. Moody accomplished what hundreds of men had failed to do in years of trying and, had the last shot not been effective, he probably would not have lived to tell the tale.

This grizzly weighed 1450 pounds, more than a large horse, and for nearly twenty years had been hunted in vain by ranchers and rangers. It is estimated that he killed stock worth $2,000 a year and in the twenty years of his depredations cost the ranchers and stockmen some $40,000. Is it any wonder that they wanted him killed, spent days in trying to get him, and finally offered rewards amounting to $800 to the man who bagged him?

Old Toto, as he was called, roamed in the southern section of Utah, in what is known as Dixie Land, and he waxed wise, and fat in his many years of high living and sagacious raids upon the stock. Many parties were organized in an effort to hunt him down but all failed, although some claimed to have gotten shots at him at too great a distance to be effective. Finally, in 1907, the ranchmen were so harassed by his persistent killing,—the old brute was wise enough to usually select tender two-year-olds,—that they appealed to the Forest Service to help them in getting Toto. Dwight L. Moody, a ranger who is an experienced hunter, was assigned to the job with an indefinite leave of absence from his regular duties.

"I'll get him," he said when he started, with several days' provisions and a 30-30 Winchester. This gun is a repeating rifle carrying seven cartridges. Three days later Moody made good.

He came upon Toto's big trail the first day out, followed him for two days into the heart of the mountains and late on the third day overtook him. Toto was in a thick scrubby growth of quaking aspens, on a hilly slope. He had apparently been asleep, for he jumped up suddenly as Moody approached, stood on his hind quarters and saw the ranger fifty feet away. Moody is a

quick and a sure shot. He fired as the big bear arose to his towering height and the bullet struck rather high in the shoulder. With a terrific roar of pain and rage Toto charged down the slope, slashing at the aspens with his fore paws. These aspens were from three to four inches in diameter, and close together, yet in his charge Toto tore through them and snapped them off as if he was rushing through a field of corn.

Moody fired steadily, and as it was afterward found every shot took effect in the neck, shoulders or chest. Some knocked Toto down or staggered him, but they did not stop his deadly charge and with blood pouring from his wounds and wild with rage he lurched onward until, when Moody fired the last shot in his magazine, putting the bullet through Toto's brain, the blood from the wounded bear spurted over him and he had to jump back to avoid being crushed as Toto fell dead at his feet.

THE NEED OF EXTERMINATION

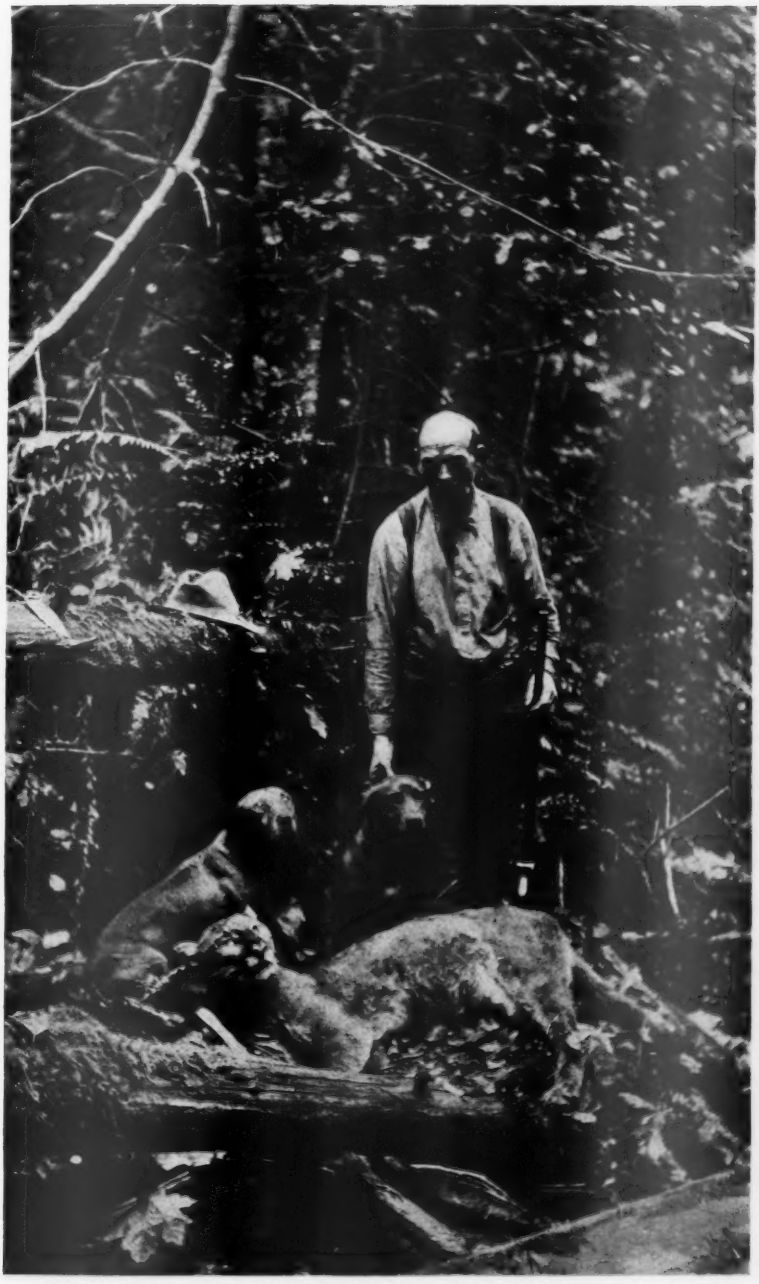
This is but one of the many thrilling stories told of the adventures of forest rangers in their persistent fight to exterminate predatory animals, yet the records of these thrilling escapes from death, these daring attacks, or prolonged hardships, are not found in the records of the Forest Service. It is no part of the duty of the brave and hardy rangers to exploit themselves. All they do is to report the number of animals killed and to tell how region after region is now being rid of the animals that prey upon the stock and the property of the ranchers and the farmers.

That the extermination of these animals is necessary is evident when it is stated that Toto killed, it is estimated, $40,000 worth of stock; that a full grown wolf will destroy about $1,000 worth of stock a year, and that the average family of wolves will get about $3,000 worth yearly. Mountain lions, lynxes, wild cats, coyotes and others are almost equally destructive. It is estimated that in Wyoming and Montana wolves kill from fifteen to twenty per cent of the increase in the herds. They usually select the calves and yearlings for slaughter, but if these can not be had cows, and often full grown steers are attacked and killed.

The problem of exterminating these predatory animals is one that calls for determined and persistent labor by men who are skilled hunters, who thoroughly know the country in which they operate and who are familiar with the habits of the wild animals. Bullets, traps and poison are used and the rangers have done most effective work. Thousands of animals have been killed and already several districts have been entirely ridden of these beasts of prey.

THE ANNUAL KILL

In the report of Chief Forester Graves for 1911, it is shown that in the states of Arizona, California, Colorado, Idaho, Minnesota, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming 7,971 animals harmful to stock and to game were killed. These

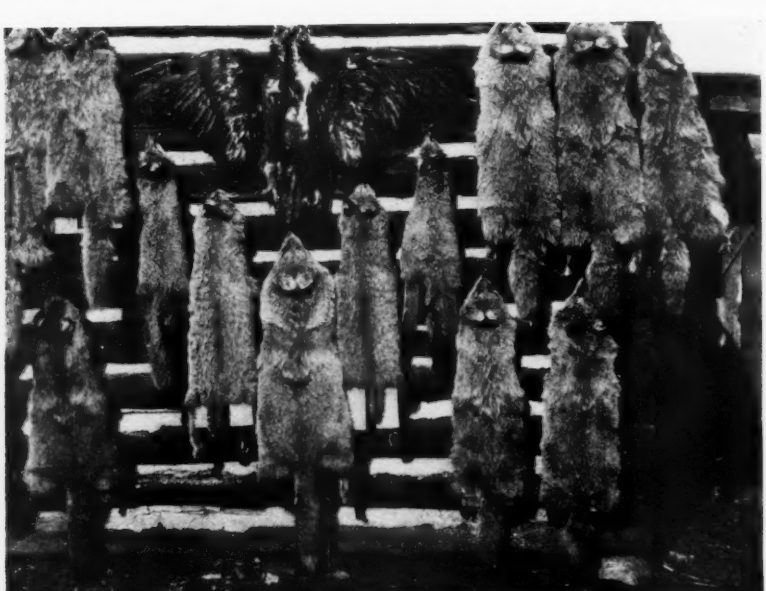


FOREST RANGER AND A MOUNTAIN LION HE HAS TRAILED WITH TWO DOGS AND KILLED.

FOREST HUNTER AT HOME SHOWING THE SKINS OF SOME OF THE LARGER PREDATORY ANIMALS ON AN OREGON NATIONAL FOREST.

A BAG OF COYOTES KILLED BY A HUNTER ON ONE OF THE NATIONAL FORESTS OF IDAHO.

EAGLE IN A STEEL TRAP, LEADVILLE NATIONAL FOREST.



FOURTEEN HIDES AND ONE EAGLE READY FOR SHIPPING, LEADVILLE NATIONAL FOREST, COLORADO.

included 213 bears, 88 mountain lions, 172 wolves, 69 wolf pups, 6,487 coyotes, 870 wild cats, 72 lynxes, 2 wolverines, and 6 foxes.

It is interesting to note that only one animal was killed in Minnesota, a bear. 1,430 were killed in Idaho and 1,432 in Utah. Most of the wolves were killed in New Mexico, most of the bears in Oregon, most of the mountain lions in Arizona, and most of the coyotes in Colorado, Idaho, and Utah.

Chief Forester Graves says: "The total number killed was 12.5 per cent less than in 1910. There was a falling off of 21 per cent in the number of bears, 10 per cent in the number of mountain lions, 53.5 per cent in the number of wolf pups, 11 per cent in the number of coyotes, 25 per cent in the number of wild cats, and 45 per cent in the number of lynxes. There was, however, an increase of 25 per cent in the number of grown wolves killed. These reductions are probably due to a general reduction in the number of predatory animals infesting the National Forests and adjacent ranges.

"The work has served as an example and a stimulus to the settlers within and adjacent to the forests, who have themselves killed many thousands of animals. On the Wallowa National Forest, in Oregon, the spread of rabies among the coyotes during the summer of 1910 caused widespread apprehension and resulted in serious losses of live stock. At the request of the settlers, the district forester assigned several of the best qualified forest officers in the State to the work of destroying the coyotes. They were so successful that this spring some of the permittees allowed their lambing bands to graze unattended throughout an entire day without suffering any loss whatever from wild animals, a condition practically without precedent in the history of the country."

SOME MORE THRILLERS

Many of the rangers are famous hunters and in any ranger's camp or at a rangers' meeting in the west the visitor may be entertained, as long as he desires to hear them, with stories of thrilling experiences. Few of the rangers, being modest men, will talk about themselves and the most famous are usually the most reticent, but they tell about the adventures of each other with eagerness. One of the best known, Jim Owens, who worked in the Kaibab National Forest district, is one of the most reticent of men. He killed 52 mountain lions along the Grand Canyon section in one year and when asked to tell of his experiences said, "I just shot 'em."

Some of their adventures are amusing as well as thrilling. Harold S. Pierce, supervisor at Sheridan, Wyo., and two assistants, were examining timber in a mountain section. They were armed with note books and fountain pens, when, at a spot thirty miles away from the nearest town, they saw a bear, a cub. Foolishly they tried to capture him, although they knew his mother must be close by. He ran into some underbrush, and following they almost ran into the arms of his mother. She did not wait for an introduction. The nearest tree was 100 yards away and it was not a big one at that. Pierce thinks he did the distance in less than ten seconds and he was the last to arrive, with the bear so close behind that she almost annexed a section of his trousers as he shinned up the tree. They had the pleasure of looking down upon the bear until nightfall when, in disgust, at their exclusiveness, she departed.

A few days later Pierce and his companions returned with their artillery and soon enjoyed some fine bear steak. They found the little cub had a sister and took the two back to Sheridan, where they still are.

Charles J. Byers, a ranger, once crawled into the den of a mountain lion, became wedged in the passage, killed the lion and had to be hauled out with ropes. Byers tracked the lion to his den, down a steep mountain side. Tying a rope to his waist and lighting a torch he crawled on his hands and knees fifty-five feet into the den. There he stuck. He was in danger from the animal and also from suffocation, as his body filled the passage. He kept the torch alight, however, until he saw the lion's eyes, aimed a little below them and fired. Fortunately for him he killed the lion instantly. Then he extinguished the torch. His partner, following him down the mountain, found the rope and after much pulling, aided by Byers' twisting and squirming, he finally got the ranger out of the den, much scraped and scratched but otherwise unhurt.

Many of the animals are now killed by poison, that being found most effective, especially with wolves and coyotes. A number of these animals are also caught in traps, but poison easily stands first as a means of exterminating them. Of this plan, John A. Rhodes, an experienced ranger, says: "Its advantage lies in the ease and rapidity with which it can be handled. Where the labor of a half a dozen men would be required in setting and watching a line of traps, one man could easily cover the same country with poison. The greater the number of baits the greater the chances for killing.

"For bait fresh rabbit meat is the best, but if this is not to be had boiled ham, fresh liver, mutton or beef tallow, bacon or quail are fair substitutes. The quail, if broiled, and the breast meat used is almost equal to the rabbit. Never poison anything containing a bone. Never touch the bait with the hands or any part of the body.

"Strychnine is the best poison. Ordinarily, as much as can be held upon the point of a large blade of a pocket knife will prove fatal to any animal. This quantity should be put in the center of a cigarette paper, the sides of which must be gathered together around the poison and the ends securely tied, forming a capsule. Dip the capsule in a can of melted mutton or beef tallow, using wooden tweezers to handle it with, and hold it there until it is well coated and then drop it into a long necked bottle. When the bottle is well filled with capsules you cork it tight so that the contents will not be exposed to barn or house odors.

"Each of the poisoned capsules is put in a piece of meat, which, in turn, is dropped into a fruit jar and shut up tight. Every precaution must be taken not to touch the meat with anything that will leave an odor. Always drop the bait from a horse, leaving it in some place where coyotes or wolves cross or travel.

"Never dismount, but take particular note of the position of each bait. Deposit the baits in the afternoon and gather them up in the morning. Do not leave them out all day."

DEAD CHESTNUT TREE IN FOREST ON SKYUKA MOUNTAIN NEAR TRYON, N. C., MARCH, 1903.

DEAD CHESTNUT TREE IN FOREST ON SKYUKA MOUNTAIN NEAR TRYON, N. C., MARCH, 1903.

RELATION OF INSECTS TO THE DEATH OF CHESTNUT TREES

By A. D. HOPKINS

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THE history of the discovery of the chestnut blight disease in this country and its rapid development from a local to a State and Interstate problem is well known. The history of extensive dying of chestnut throughout its range from Vermont to Mississippi and the relation of insects and other factors to the primary cause is, however, not so well known. It appears that there are a number of agencies of destruction other than this new chestnut blight disease which must be taken into consideration and investigated before the problem of protecting the chestnut can be solved.

Investigations have shown that there must be other specific diseases and we know that there are a number of insects which have been the direct or indirect cause of the death of a large percentage of the chestnut over extensive areas in which the new chestnut blight disease is not known to occur. When we review the history of unhealthy and dying chestnut during the past half century, it is surprising that there are any living trees left within the natural range of the species. In fact, there are not many left in some sections of the Southern States where it was abundant fifty years ago.

REPORTS DURING THE LAST CENTURY

We have the statement of Mr. C. F. Smith a resident of Stanley, North Carolina, that in 1845 there was a large amount of healthy chestnut in the State and that about that time it started to die very rapidly, that there was considerable chestnut in 1865, but at present there is very little left except on steep northern slopes.

We find a note in *Science* of December 29, 1911, crediting a statement to Professor Eugene Hilgard of Berkeley, Cal., to the effect that he found in the northeastern part of Mississippi, in 1856, that the chestnut trees of that region, both young and old, were dead.

In an appendix to a report of the Geological Survey of North Carolina, 1873, Mr. William C. Kerr, stated that "the chestnut was formerly abundant in the Piedmont region, down to the country between the Catawba and Yadkin rivers, but within the last thirty years they have mostly perished. They are now found east of the Blue Ridge only on higher ridges and spurs of the mountains."

A correspondent at Sanford, Tenn., in a letter dated October, 1901, stated that the chestnut was threatened with complete destruction in some parts of the country, and that a timberman found on a 100-acre tract only one living tree out of possibly 400.

A trouble affecting the chestnut near Grange Camp, Va., was investigated by Messrs. Wm. H. Ashmead and F. H. Chittenden, of the Bureau of Entomology, in June, 1893. They found that a vast majority of the second growth chestnut, some of it as much as 18 inches in diameter, was dead or seriously affected and dying. After a careful examination of many dead and dying trees, and of two living ones scarcely showing the evidence of disease, it was made quite evident that the primary cause of the destruction of the trees was the two-lined chestnut borer.

The extensive dying of chestnut trees in the southern Appalachians was verified, in 1904, by observations of Mr. W. F. Fiske, of the Bureau of Entomology, during a special investigation of the subject. In his report he states: "In the region immediately south of Tryon, N. C., (which appears to be typical of a very large region extending in an irregular strip from somewhere in the central portion of North Carolina and Georgia) practically all of the chestnut had died so long before as to have disappeared except for the old stumps, a few logs, and an occasional struggling sprout. In a region north of Tryon the chestnut was in a perfectly healthy condition, but in the immediate vicinity of Tryon the trees were then dying by the wholesale, old and young alike." My own observations in the southern and middle Appalachians during the past ten years have convinced me that there has been a widespread destruction of the chestnut of that region, and that the chinquapin has also suffered.

In the *Journal of Science and Arts,* 1846, it is stated that the chinquapin died in the period from June to September, in the vicinity of Riceboro, Ga., in 1825 and was still dying in 1845. I am informed by an old resident of Virginia that the once abundant chinquapin of southern Virginia and northern North Carolina disappeared quite suddenly about fifty years ago.

CHESTNUT INSECTS

In addition to these significant historical records, I may say that the insects of the chestnut forest trees have been the subject of general investigation by the West Virginia Agricultural Experiment Station and the Bureau of Entomology, U. S. Department of Agriculture, since about 1893. The published and unpublished records of these investigations show that 354 species of insects were found to inhabit the chestnut trees. We also find that other observers have recorded 164 species. By eliminating all duplicate records, the total is 472.

All of these insects are not destructive, but among those that are, we have found one species that is perhaps as important as all of the others combined. It has, therefore, been the subject of more investigation and consequently we know more about its habits and the methods of controlling it. It is the so-called two-lined chestnut borer, a small, elongate beetle which flies in May and June and deposits its eggs on the bark of living and dying chestnut, oak, beech, and ironwood in the Southern, Middle and Eastern States. The elongate, slender larvæ mine in the inner bark and outer wood in such a manner as to girdle the trees. When they have attained their full

growth they transform to the adult stage in the outer wood, or bark, to emerge the following spring and repeat the process. Our investigations have shown that this is the most destructive insect enemy of the chestnut and oak, and that it can be controlled by disposing of the infested trees in such a manner as to destroy the bark on the main trunks during the fall and winter months.

INSECTS AND THE BLIGHT DISEASE

Investigations by the Forest Pathologist of the U. S. Department of Agriculture have made available much of the essential information relating to the character of the organism which is responsible for this new disease and how it kills the trees. They have found that the spores find their way to the living tissue through some sort of wound or opening in the bark of the trunk, branches, and twigs, and that the majority of such openings appear to be caused by bark-boring insects. It has been stated by the Forest Pathologist that in many parts of the country where the disease is prevalent 90 per cent of the infection by the chestnut blight disease is due to a primary wound in the living bark made by bark-borers. Recent investigations by Mr. Craighead in Pennsylvania and examination of specimens submitted to us by the Forest Pathologist at Washington tend to verify this general statement. It is found that a large number of species of insects are more or less responsible for making a primary wound through which the spores of the disease may find entrance to the living tissue and thus result in a weakened condition or death of the tree which in turn contributes to the multiplication and spread of both the disease and the interrelated insects.

It is, therefore, evident that we have an insect problem of perhaps equal importance to that of the blight itself. The Forest Entomologist as well as the Forest Pathologist has more work to do before we can arrive at definite conclusions as to the most economical and effectual methods of combating these two agents of destruction. Indeed, this interrelation of insects and chestnut blight presents a new and complicated problem which will require a great deal of exact scientific investigation before we shall be warranted in arriving at conclusions or giving specific advice on methods of control and prevention.

EXTENSIVE INVESTIGATIONS

The importance of having the best information that can be secured on the whole subject of insects in their relation to the chestnut has led to the undertaking of an extensive investigation under a special project of the branch of Forest Insects of the Bureau of Entomology. This investigation will be extended into all parts of the country where the chestnut is, or has been, an important forest tree, and especially in the States and sections where the people representing the private, municipal, and State ownership manifest a special interest in this phase of the problem. State officials can render a service to their State by public recognition of the work and by offering such

facilities and assistance as will contribute to the value of the final results, because the results will be availabe to them and to the people of their State.

Under the head of methods of procedure towards the protection of the chestnut from its insect enemies, I may say that in our work on the destructive insect enemies of the Rocky Mountain and Pacific Slope regions, it has been forcibly demonstrated that any direct attempt to control or prevent widespread depredations by insects without a knowledge of the essential facts about the depredator and of the peculiar methods necessary for its control will result in failure and a waste of energy and money. It has been shown that with action based on results of investigation, and a consequent knowledge of the fundamental facts and principles involved, more can be accomplished with a few hundred dollars than with many thousands of dollars without such knowledge. Therefore, in taking up any new problem the expenditure of public funds should be first directed to the determination and dissemination of authentic information before any attempt is made to get practical results. In other words, practical application must follow and not precede scientific investigations and expert advice, just as legislation for the control of forest insects, to be effective, must follow, and not precede, education on the principles and methods of control.

It should be noted in this connection that the chestnut is not the only tree of the eastern forests that is suffering from insects and other enemies. The hickory, the black locust, the oak, the hemlock, and the pine, have their distinctive enemies and in some localities in every State one or more of these tree species have been practically eliminated from the forest.

It is natural for the owner of a forest or the general public to assume that, because of the enormous number of insect and other enemies of forest trees, there can be no practical method of controlling extensive depredations or of preventing losses from their ravages. Such an assumption is, however, far from correct, even in the case of the most destructive species.

HOW TO CONTROL DEPREDATORS

Recent demonstrations in the western forests and our extensive observations in all parts of the country have shown that in many cases it is entirely practicable to control insect depredators and save millions of dollars at an ultimate cost which is comparatively insignificant.

The steps towards the successful protection of forest trees from their insect enemies are:

1. Investigations to determine the essential facts about the principal insects which are capable of killing trees.

2. Concentration of the investigations on the most important species to determine their seasonal history and habits, and the most economical and effectual methods of preventing serious depredations by them.

3. Dissemination of authoritative information on the essential facts and principles of control and prevention, by means of circulars, press notices, lectures, special field instructions, and field demonstrations.

A DYING AND A DEAD CHESTNUT TREE NEAR TRYON, N. C., SUMMER OF 1904.

WORK OF TWO LINED CHESTNUT BORER IN INNER BARK OF LIVING CHESTNUT.

A DEAD CHESTNUT TREE NEAR TRYON, N. C., 1904.

4. Practical application of this information by the owners of affected and threatened timber under strict adherence to the recommendations.

In conclusion I wish to say that in our general investigations and practical demonstrations, we have recognized that the State and Federal Governments can render the greatest service through investigations and the dissemination of information and that it is the owner who should make the practical application. Therefore this chestnut problem is the people's problem and especially that of people who are owners of valuable natural or cultivated growth. It seems to me that the only way the successful protection of the chestnut resources of the country can be brought about will be through individual and co-operative action by the owners. They are the ones to be directly benefited, financially and otherwise. I am sure that, as a rule, they are anxious and willing to do everything they can afford to do if some one will show them how and demonstrate to them that, as a business proposition, it will pay. They will then not only try to protect their own timber but will realize that there is a common interest involved and will be impelled to help their neighbors, their County, and their State.

THE BUSY RANGER

Under the spreading pinyon tree
  The Ranger station stands;
The Ranger, a busy man is he,
  With Economy and Working Plans,
And the many things he ought to do
  Far more than fill his hands.

His form is lean and lank and long,
  His face is like the tan,
His brow is wet with bloody sweat,
  He does whate'er he can,
He looks the User in the face,
  And owes not any man.

Hour in, hour out, from morn till night,
  You hear his Oliver go,
You can hear him pound the keyboard black,
  With measured pound and slow,
Like a sexton ringing the village bell,
  When the evening sun is low.

The children coming home from school
  Look in at the Station door,
They love to see the Ranger man,
  And hear the Ranger roar,
And catch his burning words that fly,
  Like chaff, from the Station door.

Working—planning—economizing—
  Thus through the year he goes;
Each quarter sees a new Plan begun,
  Each quarter sees its close.
A whole lot planned, and some of it done,
Has earned a night's repose.

—*From Apache National Forest News Letter.*

THE UNDERGROUND WATERS OF NEW MEXICO*

By WILLARD E. HOLT

A BUDDING historian of the twentieth century has recently declared that one of the smiling valleys of New Mexico was the original "Garden of Eden" and that off-shoots of the original apple tree are still bearing fruit. Partial proof of this was established in my mind this year, when I saw apple trees springing from the parent root full three centuries old and still bearing fruit.

New Mexico is surely fulfilling the Scriptural prophecy: "And the desert shall be made to rejoice and blossom as the rose." Isaiah might have been speaking of our region when he referred to roses, for nowhere under the canopy of heaven do flowers grow more luxuriantly than in the great Southwest.

For some reason, as yet unexplained by science, rainfall in the North and East has been gradually lessening for the past decade, and farmers, who for years have harvested abundant crops, have been forced, against their will, perhaps, to agree with a statement recently made that shrewd, hard-headed farmers are turning their attention to western farms. Naturally, they want to improve water as well as land conditions. In other words, they want to be their own rain-makers. In order to do this they must come to the states where irrigation is practiced.

Government projects and the reclamation service appeal very naturally to people and it is not my purpose to dissuade any one thus inclined from making full and exhaustive examination into any and all projects now in operation or to be hereafter promulgated by our generous Uncle Sam.

It is well, however, that all people should know that it takes real money and lots of it for one to succeed on any reclamation project where the initial cost runs into millions. Men with money, brains and energy will succeed on these projects, even though the cost of obtaining title to the land ranges from $45.00 to $70.00 per acre, with a perpetual tax for maintenance of community ditches added.

Intelligent farmers are coming to the irrigation idea as the only reliable get-rich-quick scheme without a penalty attached. With the "Back-to-the-soil" movement there comes a land-hunger and water-thirst that can only be supplied by states like New Mexico. People who have never traveled the length and breadth of this mighty Southern Empire can scarcely realize that we have 4,000,000 acres of land under our beautiful turquoise sky with an available water supply, as specified by surveyors, and for which applications to the Territorial Engineer have been made with but 750,000 acres now irrigated, according to Engineer Miller's report. This estimate includes the largest irrigation project in the world, now being constructed at Elephant Butte, down to the smallest valley consisting of only a few thousand acres.

The peopling of this grand domain, where health, opportunity and opulence await the man who says: "I will," is going forward with rapid

WELL PUMPING 1,400 GALLONS PER MINUTE FOR IRRIGATION FOUR MILES EAST OF DEMING, N. M.

IRRIGATION DITCH SUPPLIED BY WELL PUMPING 1,300 GALLONS OF WATER PER MINUTE NEAR DEMING, N. M.

irresistible strides and the true American spirit. The best civilization of our country is joining the forces of Nature in building a commonwealth that will be the peer of any in the Union, and with climatic conditions surpassing them all.

New Mexico has successfully practiced irrigation since the latter part of the sixteenth century, so that we claim nothing new except improvement in method.

HALF A MILLION ACRES

Aside from the area that has and can be reclaimed by harnessing our rivers and streams, we have nearly a half million acres of the richest soil in America, that is, or may be successfully irrigated by underground waters pumped from shallow depths, thirty-five to one hundred feet. Of this vast area, not over five per cent has been put under cultivation, but that five per cent has demonstrated to the world the absolute guarantee of wealth vouchsafed to the man who pins his faith upon the magic of the pump, has the cash or credit to buy the pump and applies himself with energy and intelligence. In every county of the new State there are areas that are being or may be reclaimed at enormous profit by the now proven system of pumping for irrigation.

At Roswell, in the great Pecos Valley, where hundreds of artesian wells tap the underground waters, and many pumps are also in use, there have been shipped this year over 8,000 carloads of the finest orchard and field products in the world, worth not less than $3,000,000, to say nothing of trainloads of livestock, wool and cotton. This is relatively true of the whole of the great Pecos Valley, whose 1911 alfalfa product alone is worth almost a million dollars.

A single pumping proposition near Roswell includes 13,000 acres, with twenty-eight miles of electric transmission lines connecting the motor-driven pumps. The residents of this beautiful city say that apple orchards in that vicinity are cheaper now at $1,000 an acre than they will ever be again.

The Portales region can boast the largest central irrigation power plant in the United States, where farmers are pumping on the coöperative basis, the original cost being $35.00 per acre, but the cost of maintenance has thus far been but $1.50 per acre. The longest transmission line does not exceed eighteen miles and the acreage that will eventually be reclaimed will exceed 150,000. Everything, except citrus fruits, is grown in great abundance and a fine beet sugar factory will soon add value to the area. It might be added right here that New Mexico sugar beets, like her fair women, are the sweetest in the world.

The Estansia Valley is doing wonders around Willard and Estansia, through the magic of the pump, where the cost of an acre-foot of water is about $1.75, their products this year show 1,200 pounds of beans per acre, 200 bushels of potatoes, with other crops in proportion, and truck farming producing $300.00 per acre or better, which latter fact applies to all our valleys.

At Almagordo, the pump is also becoming a great factor in profitable farm development.

THE ALBUQUERQUE REGION

The Albuquerque region, and in fact the whole Rio Grande Valley, is starting on an era of prosperity through the instrumentality of lifegiving water, pumped from the earth, to give necessary moisture for plant growth. There are a number of small irrigation wells in the vicinity of Fort Bayard, the largest army sanitorium in the United States, if not in the world. Speaking of sanitoriums, it may be truthfully stated that New Mexico is one great sanitorium, where health makes wealth easier and where Nature has been most lavish in her gifts to men.

The Mimbres Valley is located in the southwestern part of the state and lies largely in Luna County. It is surrounded on every side by mountain ranges which effectually protect it from severe storms, an approach to a cyclone never having been known. Its level area is well described in a recently published report of Hon. Charles D. Miller, Territorial Engineer, which says:

"Estimates of the possibilities of this valley place the figures of irrigable area from wells producing from 500 to 1,200 and even 1,500 gallons of water per minute at 100,000 acres. To this area it is conservatively estimated that there may be added 100,000 acres irrigated from wells producing 500 gallons down to possibly 200 gallons of water per minute."

The valley has an underground basin filled with water filtered for many miles through sand and gravel, rendering it the purest body of water in America. The Government analysis last year of the water used by the Deming City Water Works, which is a part of this underground flow, gave 30 parts total solids, chiefly magnesia and iron, to 100,000 parts of water. Without chemical treatment of any kind this water is used for every purpose, scientific or domestic, and is applied direct from the pump with absolute safety to every form of plant life which means everything in the vegetable kingdom, outside of citrus fruits. Its quantity may be most easily and quickly understood when we say the report of a Government engineer in charge of irrigation investigations, this year, said: "If 300,000 acre feet were withdrawn from the underflow in one year, a condition almost impossible, it would lower the water plane below but 3.5 inches."

From this underground sea more than 200 pumps, ranging in volume from 200 to 2,000 gallons per minute, are truly making the desert blossom as the rose.

Using the Mimbres Valley as a leading exponent of pumping for irrigation, we submit the following facts: Relinquishments from present holders of land may be obtained for from $5.00 to $25.00 per acre. Unimproved deeded land may be purchased for from $15.00 to $100.00 per acre, the price being regulated to a certain extent by the distance from Deming, the chief market town of the valley, and chief railroad center of New Mexico. Tracts of five

to twenty acres, improved with water developed, may be purchased, close in, at $125.00 to $150.00 per acre.

Cost of wells and pumps: A well, pump and 35 H. P. electric motor, sufficient to successfully irrigate 150 to 200 acres, costs $2,300 to $2,600. The same well costs from $400 to $600 more when driven by a 40 H. P. gasoline engine, a crude oil engine being slightly more expensive than either, which is overcome by a cheaper operating expense.

Cost of putting water on the ground: Getting right down to brass tacks, in order that a child may understand and computing the cost of 100 or more large and small successful pumping plants, it costs a half cent to pump 1,000 gallons of water, a season's irrigation, costing from $3.00 to $9.00 per acre, according to the amount of water required for various crops and the skill of the irrigator. These figures are based on electricity at 3 cents per K. W., engine naphtha at 12 cents, and crude oil at 6 cents per gallon, and with the increasing consumption all of these products are getting cheaper.

Plowing and irrigation are carried on every week in the year, and in most of the market gardens, vegetables are grown the year 'round. Winter irrigation for spring and summer crops is gaining in favor.

*From an address at the National Irrigation Congress.

THE LARGEST SASSAFRAS TREE

By ADIOLA GRAY

SEVERAL months ago the statement was made by the Department of Agriculture that the largest sassafras tree in the world grows in the yard of the First Methodist Church in the city of Atlanta, Ga. According to the reckoning of experts this tree is more than one hundred years old. It is fifty feet high and has a spread of more than forty feet. Printed reports conflict as to the size in circumference; one giving it as seven and a half feet, and another as being eleven feet.

The discovery has recently been made that there is a tree of this species growing on the farm of James M. Jenkins, near Glendale, Hardin Co., Ky., which is much larger. The height and age of this tree have not been reckoned, but it has a circumference of fifteen feet one-half foot above the ground, and is fourteen feet in circumference eight feet above the ground where the first limb is given off. Judging from the great size of this tree it must be even older than the one growing in Atlanta.

To provide for carrying out an agreement under which South Dakota school lands will be exchanged for National Forest land of equal area and value, President Taft has signed a proclamation which makes it possible for the State to select immediately 60,143 acres of land from the Harney and Sioux National Forests.

WINDBREAKS: THEIR INFLUENCE AND VALUE

A Review of Forest Service Bulletin 86, by Carlos G. Bates

By GEORGE L. CLOTHIER

THIS publication fills a long felt want and is the most exhaustive treatment of the subject of windbreaks ever attempted in this country. The magnitude of the investigations made by the Forest Service as a basis for this bulletin may be appreciated when it is known that the extent of branching of the various species was determined from measurements of 1319 plantations. The effect of plantations on evaporation was learned from 865 hourly readings of evaporometers. The observations were distributed through the months of June, July, August, and September, 1908.

The horizontal extent of tree roots into cultivated land adjacent to the windbreaks was determined for 152 groves representing eight species. Effects on temperature were derived from 30 readings, and crop yields were studied in 12 fields.

The bulletin is divided into four parts. Part I is a synopsis of the conditions which the study attempted to measure. Part II is a record of the measurements of the physical factors entering into the problem with interpretations of the physiological effects of these factors upon animal and plant lift. Part III deals with the timber production of windbreaks and shows how to assess their cost against the land they have damaged and occupied. Part IV summarizes the protective value of windbreaks and calculates the profitable area to devote to windbreaks of various species. Specific recommendations for planting in the several regions needing windbreaks are found in the concluding pages of the bulletin.

The study was carried on chiefly in the States of Kansas and Nebraska, although some measurements were made in Iowa and Minnesota. The season chosen for the study proved to be more humid than the average with less wind in the summer months than usually occurs in the region, hence the effects observed may be taken as underestimates rather than over estimates of the influence of windbreaks.

The study showed that a windbreak may be both beneficial and harmful to the crops of an adjacent field. The observations showed that for the summer months a windbreak may reduce the mechanical force of the wind, lessen evaporation, stagnate the air or reduce its velocity, increase extremes of temperature both in the air and the soil, and change the distribution of moisture in the soil. In studying both beneficial and harmful influences, measurements and observations made in and near the windbreaks were compared with measurements made far enough away to be outside of the influences. The distances through which the effects of the plantations were manifested were measured in all cases in terms of height of the trees, since both beneficial and harmful effects are directly proportional to the height of the trees.

DUNES OF SAND BLOWN OUT OF THE BED OF THE COLUMBIA RIVER, SHERMAN COUNTY, OREGON.

NARROW BELTS OF EUCALYTUS ARE PLANTED ABOUT THE ORANGE ORCHARDS OF CALIFORNIA TO PROTECT THE FRUIT TREES FROM THE WIND.

The shading effect expressed in percentages is recorded as though it were concentrated on a strip equal in width to the height of the trees, and since the shaded area is often wider than the trees are high, it often happens that the figures for shade exceed 100 per cent. This method of calculation is likely to confuse the reader, and yet it is difficult to suggest a better one. Shading effects were measured by exposing solio paper in the shadow and comparing its change of color with exposures made in direct sunlight.

METHODS OF OBSERVATION

Soil moisture determinations were made at depths of 10 to 20 inches and at intervals from each windbreak of 10 or 20 feet to the limit of the activity of the roots; and from these measurements it was easy to calculate the distance and intensity of the sapping effect of the tree roots. The greatest benefits arising from windbreaks are believed to result from reduced evaporation, due to reduced motion of air currents. To measure the intensity of evaporation, evaporometers were set up at distances of one, two, and five times the height of the trees on both sides of the windbreaks and in addition at ten and twenty times the height on the leeward side.

The study of the shading effect revealed the fact that cottonwood is least damaging to crops and honey locust most, with boxelder, willow, mulberry and Osage orange following clase behind the honey locust. Cottonwood also has least extent of roots in proportion to its height, and hence has least sapping effect on the soil. It was found that all kinds of trees planted in rows oriented east and west do less damage to crops than when planted in rows oriented north and south and on the other hand trees planted in rows north and south grow faster than in rows east and west. Rows running north and south absorb more light than rows oriented east and west. Alfalfa, corn, and kaffir corn are damaged less by shading than other crops. Damages from shading may be lessened by planting in the shaded area forage crops whose value does not depend upon ripening of their seeds and by planting in the windbreak narrow crowned trees. Sapping effect can be reduced by cultivation to retard evaporation, by deep plowing to cut off the side roots of the trees and by improvements in the fertility and permeability of the soil. Uncultivated Osage orange hedges extend their roots 60 per cent farther than cultivated.

The theory of the farmers that trees impoverish the soil as far as their roots extend was tested by a number of soil analyses. The analyses showed that there was less available nitrogen in the zone of greatest root activity than in the open field, but this reduction corresponded in position with the zone of least moisture in the soil. Since the total nitrogen in the soil permeated by the most active tree roots did not appear to be any less than that found out beyond the influence of the trees, it was concluded that the reduced moisture content had retarded bacterial action and prevented the transformation into available nitrogen of the nitrogen compounds of the soil. The deficiency of available nitrogen probably results measurably in temporary sterility of the soil.

Comparison of wind in the open with that prevailing at a point distant from the windbreak on its leeward side five times the height of the trees showed the velocity of the wind reduced 80% by the most efficient windbreaks. The most obvious effects of this great reduction of wind velocity are to prevent damages to crops by storms and to save the soil from being borne away. Before the general planting of Osage orange hedges in Chase County, Kansas, about 30 years ago a storm caused soil drifts to form several feet deep which still can be seen. The reduction of evaporation due to a decreased velocity of the wind is proportional both to the density and height of the windbreak, and the protective influence increases with increased wind velocity. The zone of greatest protection moves outward from the windbreak with increase of wind velocity and the width of the protected belt becomes wider. The belt of efficient protection averages two times the height of the trees to windward and ten times to leeward. If the trees are 50 feet tall they will protect a belt 600 feet wide. The percentages of moisture saved varied in the observations from 12 to 40 per cent.

It was discovered wholly unexpectedly that windbreaks possess great value as heat regulators. All temperatures studied ranged upwards from the initial temperature for growth, namely from 41° F. The highest daily temperatures and the lowest nightly temperatures occurred at the place where the windbreak retarded the movement of the air the most. The superheating and cooling effects were increased by increasing wind velocity, and decreased in cloudy or rainy weather. It is probable that the effect at night during the growing season is always beneficial by retarding transpiration and thus checking the cooling effect of evaporation upon the leaves. Since photosynthesis does not take place in the absence of light, transpiration during the night could have no beneficial physiological effect; hence any influence that will retard transpiration during the hours of darkness must be a beneficial one. The superheating of the atmosphere in the daytime is most important in the spring and fall when the supply of heat is lowest. Soil temperatures were highest in the zone of greatest protection during the season of increasing temperature and lowest at the same point during the season of decreasing temperature. The author concludes that the summation of the diurnal and nocturnal effects during the growing season is a positive quantity, and hence the average effect of a windbreak is to increase the available heat to the plants growing in the protected zone. The effect of the superheating of air and soil over the protected belt is to create hothouse conditions on a large scale at the season when the plants need all the heat they can get. Measurements of increased yields of corn attributible to superheating effect showed a gain in one field of 40 per cent in the zone of most efficient protection and a gain of almost 15 per cent at a distance to leeward of ten times the height of the protecting trees.

Although some orchardists claim that windbreaks are harmful, it is certain that their effects in Nebraska in the season of 1908, were beneficial.

LOMBARDY POPLAR PROTECTING AN ORCHARD IN THE WEST.

THE MONTEREY CYPRESS IN CALIFORNIA MAKES AN EXCELLENT WINDBREAK FOR THE PROTECTION OF CITRUS ORCHARDS.

Protected orchards yielded from five to ten times the fruit that was borne by exposed orchards, the damage to the fruit crop having been caused by a cold northwest wind in April accompanied by precipitation. The distribution of the fruit on the trees and through the orchards proved that the April storm from the northwest was responsible for the killing of the fruit buds and for the small crop of apples where windbreaks were not present. Wind accompanied by precipitation is very trying to vegetation because the rapid evaporation of the moisture on the leaves and branches consumes heat in large quantities and depresses the temperature of the plants to a harmful extent.

The curves and tables refering to temperature would seem to indicate that the heating and cooling effects of windbreaks practically balance each other except in the area occupied by the trees. The investigations did not take cognizance of the times either at night or in the winter when the normal temperatures of the air fall below the soil temperatures. At such times, the reduction of wind movement in the protected zone would cause the air temperatures to rise because of radiated heat coming from the soil, hence the effect of the windbreak would be to cause heat to accumulate in the air of the protected area. This effect would be to prevent frosts rather than promote them.

THE FINANCIAL BENEFITS

In measurements of the direct financial results and timber yields, this bulletin presents the first effort on the part of an investigator to ascertain the damaging effects of windbreaks outside of the area belonging to the trees, and to charge the plantation with the occupation and use of the land so damaged. For instance, an Osage orange hedge a mile long oriented north and south and 31 years old is charged with the use of 3.54 acres of land in Table 23. In some of the earlier publications of the Forest Service, single rows of trees were considered as not occupying any space, and the acreage of blocks and belts was computed from measurements from outside row to outside row. In small groves and narrow belts the error from such measurements often exceeded two hundred per cent. It is gratifying to note that the Service has at last worked out accurate and scientific methods for obtaining the value and yield of small farmers' plantations.

The acreage occupied by single rows one mile long was computed by the formula, $A = \frac{CF \times H \times \frac{3}{5} \times 5280}{43530}$ where A represents acreage, CF the factor of damage to corn in percentage of height of trees, H the height of the trees, and the factor 3-5 is assumed to be the average damage during the whole life of the trees, it being conceded that the damage during the early growth of the plantations was very much less than their present measured damage. The formula can be used for single rows of any length provided the actual length in feet is substituted for the number 5280. If the acreage occupied by a belt a mile

long is to be calculated, the width, D between outside rows of the belt must be added and the formula becomes $A=\frac{(D+CF\times H\times\frac{2}{3})\times 5280}{43560}$

Calculations of the market values of the timber were based upon stumpage prices of $10.00 per thousand board feet for saw logs and $2.00 per cord for firewood. Fence posts were valued at 5cts. to 24cts. each according to kind and quality. The prices allotted to fence posts are conservative except for cottonwood and soft maple which are practically worthless for posts and rarely used for such purposes. The computations show that cottonwood 10 to 40 years old is capable of producing values of $1.26 to $5.39 per acre per annum in lumber and fuel, reckoning interest at 4 per cent per annum. A single row one mile long of cottonwood trees oriented north and south and 40 years old was worth $3,270. Another row of the same age oriented east and west was worth $2,296 per mile. The values of the north-south rows is strikingly greater than those of the east-west rows, but when reduced to acreage values the difference disappears, because the north-south rows damage much wider strips of land than the east-west rows. The measurements show that cottonwood begins to mature into saw-log size at a very early date, one plantation having produced 4,300 board feet per acre when twenty years old.

THE GROWTH AND YIELD

Equally interesting facts are brought out with reference to the growth and yield of green ash, silver maple, honey locust, white willow, Russian mulberry, and Osage orange. The great value of Osage orange and mulberry in hedges is realized when we learn from this bulletin that four different hedges of the former species ranging from 20 to 31 years old were each worth over $1,000 per mile, and that two mulberry hedges 11 and 12 years old respectively were each also worth more than $1,000 per mile. The annual acreage values of the Osage orange plantations ranged from $1.18 to $12.51, while one mulberry plantation earned as much as $32.75 per acre per annum, allowing interest at 4 per cent.

Catalpa is not suitable for windbreak plantations because of its susceptibility to damage from wind and drouth. White pine and Scotch pine are very promising trees for windbreaks in the Lake States and the Middle West.

The last ten pages of the bulletin are devoted to a discussion of methods and plans for the establishment and management of efficient windbreaks. The protection afforded by an Osage orange hedge on the average is equivalent to the yield of a strip twice as wide as the height of the trees, while the protection afforded by the most efficient grove is equivalent to the yield of a strip three times as wide as the height of the trees. "This means that the farmer in the Middle West can afford to maintain a windbreak running through the farm from east to west, and having a width of 240 feet in the case of mature cottonwoods 80 feet high," (page 90). Such a grove will occupy approximately 15 acres on a quarter section; but two such belts of timber are required for the efficient protection of 160 acres. Such windbreaks will pay a rental in protection equivalent to the grain that would grow on the land

they occupy. The timber that they will produce will be clear profit to the land owner.

The author figures that the protective value of a good cottonwood windbreak a mile long at the end of 40 years, computing compound interest, amounts to the enormous sum of $35,585.50. Reckoning the cost of an acre of this grove also at compound interest, he finds it to be $2,186.01, so that the area of the grove that will pay its way from the beginning is $\frac{35585.50}{2186.01}=$ to 16.28 acres, which is equivalent to a belt 134 feet wide.

In conclusion, the author submits an ideal plan for the protection of a farm in the Middle West. It differs from other plans previously recommended by the Forest Service chiefly in orientation of practically all the plantations in an east-west direction. Modifications of this plan are suggested to fit the high, dry uplands of the Middle West and the cold northern prairies.

Recommendations for plantings are also given to fit the Lake States, the Eastern States, the Southwestern States, and the fruit growing regions of the Pacific Coast States. All plantations proposed are restricted in area as nearly as possible to such an extent that their protective value will pay for the land they occupy. With such plantations the farmer can grow his timber free of cost. A copy of this bulletin should be in the hands of every farmer inhabiting the treeless sections of our country.

QUESTIONS AND ANSWERS

Many of our readers frequently desire to secure some expert advice regarding various features of forestry work, and do not know to whom to apply for the information.

The Editor has accordingly decided to establish this column in which he will be glad to publish such questions as may be sent to him, and give the answers, whenever the questions relate to any detail of the work which this Association is doing or such information as it can give.

The Editor requests that communications be written on one side of the paper only and if possible, be typewritten.

SPOKANE, WASH., *Mar.* 17, 1912.

Editor American Forestry:

Will you kindly tell me if there are any public forestry schools or any through which a person could work his way in the State of Washington?

VERNE CHURCH.

A forestry course is given at the Washington Agricultural College, at Pullman, Wash., at which I understand there is merely a nominal fee for residents of the state.—*Editor.*

DETROIT, MICH., Mar. 15, 1912.

Editor American Forestry:

I write regarding Florida lands about seven miles west of Lake Worth. How far do the everglades run east of Lake Okeechobee? I have bought some land of the Palm Beach Farm Co. and would thank you for any information regarding same. What about the climate? H. E. RUPP.

The everglades run 45 to 60 miles east of Lake Okeechobee. We have no information about land companies. The region seven miles west of Lake Worth is moderately healthy, the soil is fertile. This is about on the edge of the everglades.—*Editor.*

POTTSVILLE, PA., Mar. 11, 1912.

Editor American Forestry:

A party in Schuylkill County claims to have a powder which will rid chestnut trees and others of the scale by putting it on the roots. He claims it has been tried with success in Schuylkill County. Is the proposition feasible? It is in the form of a powder.

S. M. ENTERLINE.

A thorough test is the only means of determining the question you ask. I suggest that you send samples to the Pennsylvania Chestnut Blight Commission.—*Editor.*

THE HARVARD FOREST

By THEODORE WOOLSEY, Jr.

THAT Harvard University is conducting a logging operation is rather a startling statement; it is true however. Owing to the generosity of Mr. John S. Ames, who graduated from the Harvard Forest School of Harvard University with the class of 1909, the Harvard forest was acquired late in 1907. Mr. James W. Brooks, who owned 1800 acres, coöperated by placing a low valuation upon this land. Contiguous owners, with holdings in the aggregate of between 200 and 300 acres, deeded these additional areas so that today the Harvard Forest comprises more than 2000 acres. It was through the courtesy of Mr. Richard T. Fisher, Chairman of the Division of Forestry, that the writer was enabled to visit this tract on January 21st and 22d in order to study the silvical method of treatment.

According to the Official Register of Harvard University, "the forest lies on hilly country at an elevation varying from 800 to 1400 feet above sea level. It is divided into three distinct blocks of (about) 850, 550, and 600 acres, which are located respectively northeast, northwest, and southwest of the village."*

In the words of the Official Register "the primary object in the possession of this forest as part of the equipment of the Division of Forestry, is its use as a field laboratory for the training of students in practical forestry." This forest is particularly valuable as a training ground for students because of the large and varied growing stock and excellent market for practically all species and all kinds of product; and because of the varied distribution of age classes. This facilitates the practice of intensive forestry. It is within two hours' ride of Cambridge and the offices in the Division of Forestry can therefore direct the administration by weekly visits, when not in residence at Petersham. Mr. Fisher feels that the school tract is the strongest single advantage of a professional school of forestry and the school is conducted at the forest from July 1st to December 1st, and from April 1st to June 10th.

EQUIPMENT AND EDUCATIONAL FACILITIES

The equipment includes buildings with bedrooms and recitation rooms, suitable storage space, "and complete set of logging and woods tools," a team used in logging, portable buildings for wood crew, etc.

Such courses as follow can be conducted during the period of field work: identification of species, soil studies, general silvical studies, including marking, planting, and nursery practice, forest management, surveying, engineering, and "forest operations," which include the details of wood management and mill work.

*Petersham, Mass.

EVEN AGED WHITE PINE, 50 YEARS OLD IN THE HARVARD FOREST.

STRIP CUTTING AND MATURE HARDWOODS AND WHITE PINE CLEAR CUT IN SWALE. ADJACENT POLE STANDS THINNED.

Among the more important species found on the tract are white pine, red spruce and hemlock, popple, paper birch and black birch, white oak, red oak, white ash, black cherry, and red maple.

According to most recent estimates which are, however, approximate, there are at least twelve millions board feet on the 2,000 acres; nine-tenths of this is white pine. The chief woods as regards yield are, besides white pine, chestnut, red maple, red oak, paper birch, white ash and some scattering black cherry which is surprisingly straight and clean boled. The forest is not a woodlot, but a tract producing chiefly saw timber, nine-tenths of which is worth $7.50 to $8.00 on the stump; marketing of this timber presents many interesting problems.

The white pine is worth $7.50 to $8.00 on the stump, the hardwoods merchantable for saw timber perhaps $4.00 and the cordwood from saplings too small to be sawn into lumber or from tops sells for 50 cents a cord standing.

There is an excellent market for all species except popple and red maple lumber. There is a considerable quantity of red maple on the tract which is considered more or less of a weed tree since ordinarily it can only be sold for cordwood. The demand for cordwood, however, exceeds the supply that at present can be cut, and no difficulty has been found in disposing of the white pine for boxes, boards, match sash and blind stock, and "square edge." The box and match stock sells for from $16 to $18, one inch square edge for $20, sash and blind stock for from $25 to $35. The chestnut sells as inch sidings for $17, and as 1½ inch round edge for $20. Selected ash, red oak, and cherry sells in small quantities at fancy prices.

THE METHOD OF SALE

It is rather surprising that Mr. Fisher has found it more profitable to do his own logging rather than to have it done by contract. The only material sold on the stump is a small quantity of cordwood taken out in cleanings. This is sold to local residents in what might be termed "neighborhood sales." In all operations trees are designated for cutting by marking although they are not stamped with any symbol to show whether they were officially marked or not. This is not considered necessary because the officers in charge are so familiar with each tract that they can distinguish if the original marking has been materially departed from. The pine brush is burned at a cost of 15 to 25 cents per thousand. The hardwood brush is usually burned, particularly when it is cut with the pine, but occasionally it is left in small piles where the fire danger is not considered great. Sales are made informally and no formal contract is required.

The results of logging during the fiscal year of 1911 give the following average cost: Sawing, $1.00 per M.; drawing in and piling, $1.75, from the piles to rollway at portable mill 20 cents; sawing at mill by contract, $2.35; "sticking" 75 cents; hauling to the market, $2.25 (hardwoods hauling to market, $4.50). Since the thinnings are taken in connection with the final cuttings, no separate figures on the cost of logging have been secured. As an

estimate, however, it is probably true that thinnings cost $1.15 to fell and saw, while the final cuttings cost but 85 cents. The average sale price for white pine for 1911 was $17.50. The total cost of delivery, according to the figures secured, amounted to $8.30. In other words, there was a net profit of $9.20 per M. feet for white pine. The cordwood sales of white pine tops probably just about balance the cost of cutting and stacking. Even on the poorer quality hardwoods, taking the total cost of delivery to be in the neighborhood of $10.20, there would still be a net profit of $3.30 and on the better quality hardwoods from $9 to $15 and up according to quality and species.

THE MANAGEMENT OF THE FOREST

Before the Harvard Corporation would agree to the purchase of this tract they wanted definite assurance that it would not be a source of expense to the university. In other words, Mr. Fisher agreed that it would be self-sustaining. The object of the management, therefore, has been (1) to secure a reasonable return, (2) to cut first the timber that was mature and secure immediate regeneration and to make intermediate cuttings to improve the growing stock.

There is at present no working plan, but it is expected that by 1914 a complete working plan will be drawn up. This lapse of seven years between the purchase of the tract and the completion of a formal working plan is accounted for by the fact that only student labor is used in the collection of data and it was desired to be very certain of local conditions and requirements before the management was committed to a definite line of action. At present the tract is mapped for topography, types and a portion for age classes. There is a rough growth table, volume table for white pine based on the mill run and more or less complete volume tables for chestnut and red maple are now being compiled. Tentatively, it is desired to manage the white pine and hardwoods on a rotation of about 60 years, but blocks of rapidly growing pine will be reserved. The actual cut at present has been fixed roughly at 250,000 feet of saw timber (chiefly pine) and 250 cords of wood. The data already collected for the complete working plan indicate that this cut may be greatly increased—possibly even doubled—with absolute safety.

Since there is considerable land either entirely bare or only covered with a scattered growth of gray birch, forestation has been started. About fifteen acres of white pine, two year old seedlings on the better sites and three year old transplants on the unfavorable sites, all spaced 6x6, have been put in.

During 1911 a good many of the white pine seedlings died during the drought and it was definitely determined that in similar exceptional seasons on the less favorable locations only transplants would succeed when planted in the open. Root competition from low brush did surprisingly little damage; in fact, the young trees succeeded better under huckleberry and other bushes than on bare ground. In the large openings the plantations will undoubtedly be successful, but in the small openings with a diameter of 50 to 100 feet,

THIRTY-YEAR-OLD WHITE PINE AND BIRCH BEFORE CLEARING.

THIRTY-YEAR-OLD WHITE PINE AND BIRCH AFTER CLEARING.

it is probable that the surrounding white pine wolf trees will suppress and damage a large proportion of the plantations.

In addition, there is a small area of Scotch pine spaced 6x6. It is planned to try out red pine, red oak, and Douglas fir. Were it not for the excellent reproduction of white ash and black cherry, it is probable that blanks would be planted to these valuable species.

A number of experimental sample plots have been established to secure definite data on the different methods of treatment. For example, where the shelterwood system was tried in almost pure white pine, a quarter acre plot was not cut and nearby a quarter acre was measured to show the results of cutting both as to growth and reproduction.

The value of the Harvard forest as a demonstration of what can be done in practical forestry cannot be over-estimated and private owners would profit by visiting this tract in order to make a careful study of the different cuttings and the results. Within twenty or thirty years, when the results can be more accurately gauged, a tract such as this showing varying conditions, will undoubtedly do a great deal to encourage private owners to cut conservatively.

PROTECTION OF THE TRACT

There is little likelihood of trespass and the tract is so situated that the slightest smoke is at once seen and reported to the officer in charge. Since prompt action can be taken when fires start, no attempts have been made to establish costly fire lines and there is little danger of a crown fire except under most extraordinary conditions and then only in your coniferous growth.

There are ducks, deer, foxes, rabbits and partridges on the tract and the management allows hunting by local residents in order to promote good feeling; the damage by deer, particularly to ash seedlings, is quite noticeable and probably hunting will therefore be encouraged.

At present the 250,000 bd. ft. cut annually, is sold to net well over $17.50 per thousand, or $1,875, and the hardwood and pine cordwood for $300 additional, making roughly a net return of $2,175. While this land will probably not be taxed since it is part of the equipment for teaching forestry, yet the tract is assessed at $60,000. The present yield, therefore, amounts to about 3.6 per cent on this low valuation; the tract could be sold for $80,000 quite readily. Yet it must be borne in mind that the cutting is nowhere near the normal yield. For example, suppose 1,800 acres of the 2,000 were producing to their full capacity on a 60 year rotation. This would mean an annual cut of 30 acres, which surely should yield at least 30,000 feet per acre. If this netted only $10 per thousand, and it will certainly net more than this, perhaps double, by the time the forest is at its full producing capacity, you would have a net annual revenue of from $9,000 to $18,000.

It would be interesting to see the effect of somewhat heavier thinnings in the pure pine 35 to 40 years old, perhaps removing one or two thousand feet per acre additional, or fifteen per cent of the present stand as against

ten or twelve per cent. Of course, there is danger in admitting too much light and thus encouraging undergrowth which would hinder reproduction when the seed felling is made. More sample plots will be established (and it is hoped larger ones) since training in experimental work is part of the curriculum of the school. One would expect at least a preliminary working plan, but the drawing up of such a plan has been delayed for entirely practical reasons and it is doubtful if the management has suffered. Perhaps some of the openings have been too large, but it must be remembered that a large opening possesses a distinct value from an experimental standpoint which more than offsets the small loss through lack of pine reproduction which may result. Whether it would be better to adopt an eighty or hundred year rotation for the pine can only be determined when more complete yield-tables are available.

The popularity of the pheasant, as a game bird and as a valuable assistant to the farmer in keeping down insect pests, is manifested in the state-wide demand for eggs and birds which the New York Conservation Department is sending out from the state game farm. Despite the fact that the department will more than double the number of pheasants and eggs distributed last year, the supply for the present season will not be sufficient to meet the demands.

According to the reports received at the Ogden district office of the Forest Service from various supervisors of the National Forests there will be a shortage of water for irrigation purposes in Utah, Nevada and southern Idaho this summer as a result of a light snowfall in the mountains. In a number of localities, according to the report, the fall of snow has been less than half the normal, as indicated by years past.

By the recent affiliation of the Big Blackfoot Milling Company with the Northern Montana Forestry Association, more than 100,000 acres of timber land owned by the Big Blackfoot within the coöperative territory of the Association has been added, and the Flathead National Forest is preparing to join the Association in the near future.

More than 600,000 feet of timber was cut on the Deer Lodge forest reserve last month, which is much more than the normal production for this time of the year. Most of the timber is from the French gulch district and the indications are that the output of timber in this district for the coming year will be the largest since the inauguration of the conservation project in the several counties that are included in the Deer Lodge reserve.

SOUTHERN FORESTRY CONFERENCE

CHIEF FORESTER HENRY S. GRAVES, of the Forest Service, has issued the following statement:

"In connection with the Nashville meeting of the Southern Commercial Congress, April 8 to 10, there will be held a forestry conference. The object of this conference will be to bring together lumbermen, timberland owners, State officials, representatives of civic and other organizations, and influential men who have an interest in the forest problems of the South, in an attempt to work out a constructive program of action.

"I have promised to preside over this conference, in the belief that it will accomplish important results. The Forest Service has, as a result of recent studies, some important facts concerning particularly the forest fire problem, which will be presented at the meetings. I do not believe that either lumbermen or the public have any idea of the seriousness of the damage now done by fire in the South. In justice both to timberland owners and to the public there is urgent need for better protection of the forests of the South, which form so important a part of its resources.

"I believe that the subject is one which calls emphatically for State legislation. Fairness to all calls for an approach to uniform legislation, at least along some lines. There is, in my judgment, great need for those most nearly concerned to meet together and deal with the problems involved constructively.

"I have invited a number of representative lumbermen, State forestry officials, legislators and others to attend and take part in the conference. May I ask you to make public the fact that the conference is open to all, and that I desire to extend, through your columns, a general invitation to all lumbermen and timberland owners to attend? Measures fair to all the interests involved can be shaped up only if all points of view are fully considered, and progress toward better conditions depends upon the formulation of a program on which all can unite.

"The conference will consist of two sessions. The first will be held on the afternoon of April 8. At this session there will be a discussion of losses suffered in the South through forest fires, the possibility of control, what the timberland owner and lumberman can and should do to prevent fire losses, and how far conservative cutting will be practicable if protection from fire is assured.

"The second session of the conference will be held on the morning of April 9 and will discuss State forestry laws, fire organization, need of uniform legislation, and the coöperation of States and private owners with the Federal Government under the Weeks law."

DYNAMITING STUMPS AND TREE HOLES

THE problem of stump removal is an ever recurrent one when farmers are developing new territory or are endeavoring to utilize the entire acreage of their farms. The richness of the forest soil is a constant incentive to clear the land and make it available for cultivation, but the question is, what is the best and cheapest way to remove the stumps? The principal methods now in use are pulling with stumping machines, burning out and blasting out with dynamite.

The stump puller has its advocates who prefer it over either method and others who do not consider it economical. Apparently it is entirely a question of condition. Those who have carefully investigated the subject seem to be of the opinion that where a large number of small stumps are to be removed it pays to invest in a stump puller, provided, however, that only the cost of removing the stumps is to be considered.

The various schemes for burning out stumps are all open to one great objection, that is that the burning of a stump does not remove or even loosen up any of the roots, but it does destroy the humus in the soil, and causes barren spots for a year or so after the stump is burned out.

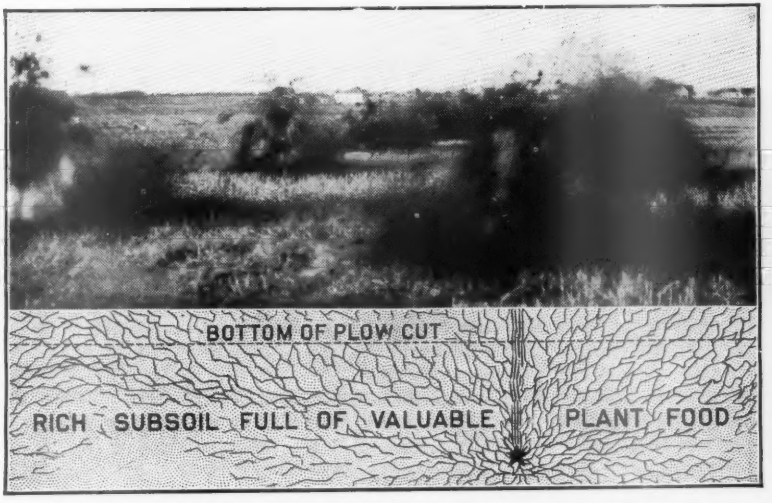
EFFECT OF DYNAMITING

Recent investigations of the use of dynamite for stump removal show that this is fully as economical as any other method with the possible exception of very small stumps, and for large stumps the advantages in its use are very great. In the western or coast states where large trees are the rule, dynamite is commonly employed for this purpose and practically every farmer or farmer's boy is a practical blaster. They handle this high explosive without accident because they have found it no more dangerous than the ordinary shotgun or gasoline. It is simply one of those things that has to be handled with horse sense and ordinary care.

The process is very simple. A hole is bored underneath the stump with a large dirt auger; the hole being usually at an angle of 45 degrees to the ground. A dynamite cartridge is primed with a fulminate cap which has been crimped on to the end of a fuse and the cartridge is then shoved down to the bottom of the hole and tamped in with some damp earth. A match is applied to the fuse which is long enough to give the farmer plenty of time to get away for 150 feet or so, and shortly after there is a boom and the stump is blown clear of the earth and shattered into firewood.

Investigation of the hole shows the roots torn loose from the earth for a radius of about two yards from the stump, and nearly all the dirt that adjoined the stump roots has fallen back into the hole after the blast. The stump parts themselves are found free from dirt as the blast clears them off

SUBSOIL BLASTS FIRED ELECTRICALLY.



ELECTRIC FIRING OF DYNAMITE SHOWING EFFECT ON SOIL.
ERUPTIONS SHOWN ARE MOSTLY GAS.

SIX-YEAR-OLD APPLE TREE PLANTED IN DYNAMITED HOLE.

SIX-YEAR-OLD APPLE TREE PLANTED IN SPADED HOLE.

BING CHERRY TREE, TWO YEARS OLD, SET IN DYNAMITED HOLE.

BING CHERRY TREE, TWO YEARS OLD, SET IN SPADED HOLE.

completely. The roots are left in such shape that a few blows with an axe will free every one of them, so that a plow can be run over the old location of the stump in almost every case without any difficulty whatever.

BREAKING UP THE SUBSOIL

But one point which is considered as most important of all in regard to the use of dynamite in stump blasting, is that the same charge which blows out the stump breaks up the subsoil. It has been found by actual experience that wherever stumps have been blown out the soil produces extra vigorous crops. On a farm in California where oats were planted on a field that had been cleared of stumps, the oats grew a foot higher over the spots from which stumps had been blown. Mr. Jas. Craig, proprietor of the Rose Cliff Fruit Farm, Waynesboro, Va., states that in his experience the value of the subsoiling effect of dynamite in stump blasting equals at least 30 per cent of the cost of the dynamite.

These figures seem really conservative in view of results he has obtained from tree planting with dynamite, by means of which apple trees planted six years ago with dynamite are twice as tall as those planted with a spade in the same lot and are so much better branched that they have about three times the bearing capacity and the fruit produced is larger and of better color. Inasmuch as the same soil condition is produced by blasting out a stump it would seem that his estimate of the value of subsoiling incidental to the stump blasting is conservative.

DYNAMITING HOLES FOR TREES

Results which prove conclusively that dynamite has advantages in fruit culture have been secured, but just how great these advantages are cannot be stated until further experiments have demonstrated the most economical methods of using dynamite in the orchard.

It is obvious that several years are required after the planting of a fruit tree in a dynamited hole, to ascertain just how its life or growth differs from one planted in a spaded hole, and further experimentation will be necessary to show whether it is necessary or advisable to use more or less dynamite per hole to get maximum results, cost considered.

The following results already determined should be of interest to progressive horticulturists everywhere:

First.—Planting trees with dynamite practically eliminates the loss of young trees during the first year.

Second.—Trees can be planted much more rapidly by the dynamite method than by the old method.

Third.—Trees planted with dynamite come into bearing from one to two years sooner than those planted by the soil method.

Fourth.—Trees planted by dynamite grow much more rapidly and yield much more heavily than those planted in the old way.

One of the chief elements of loss in orchard work is the loss of trees the first year. S. H. Bollinger, President Clear Creek Lumber Company, Shreveport, La., stated that he used dynamite in blasting the holes in which 1,080 pecan trees were planted one year ago, also for planting 8,000 peach trees. He says the percentage of loss on the pecan trees (which are among the most difficult to set so they will live), was almost nothing compared with the loss on other trees planted in the ordinary way.

Another point of great importance to orchardists is that trees planted with dynamite come into bearing much sooner than when planted by the old way. W. W. Stevens, Orchardist of Mayfield, Ga., reports that he has been using dynamite for tree planting for eighteen or twenty years and that in the planting of peach trees by this method he gained two years in six as compared with the old method. In other words, he got as much fruit from a tree planted with dynamite at four years of age as he got at six years by the old method.

Mrs. John Rawley, of Grante Pass, Oregon, reports that she plants all her trees with dynamite, as a result of careful tests, to show the benefits of this method. She advised that all trees be set in wet weather, as this insures a storage of moisture under the tree. This is the chief reason why planting trees with dynamite is beneficial.

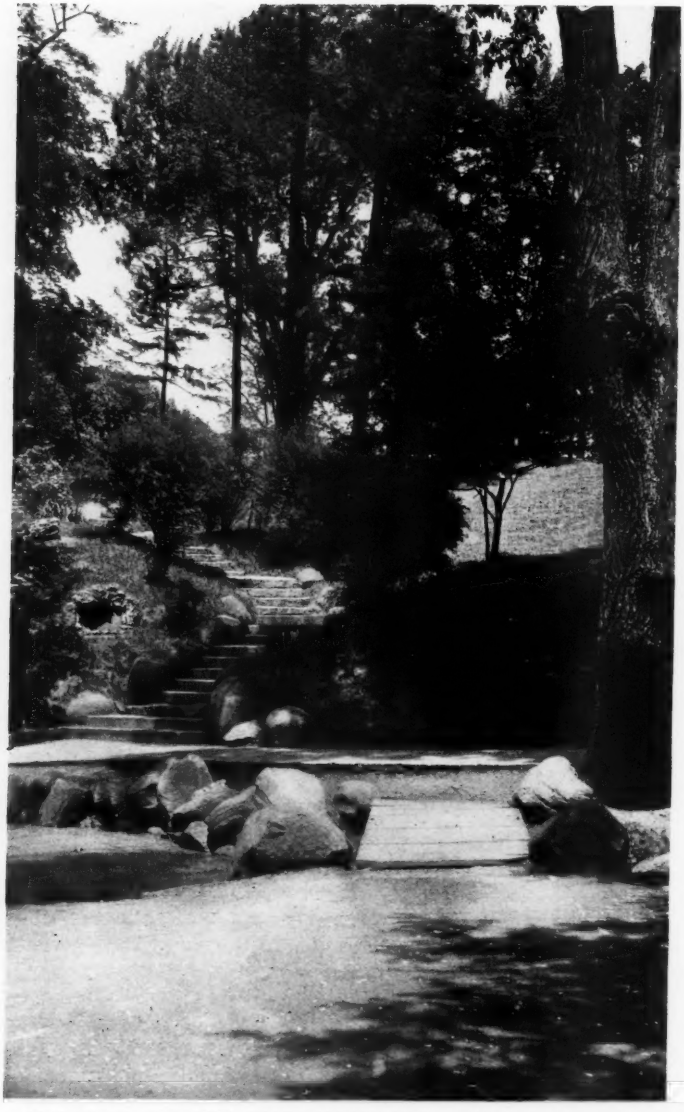
Trees planted in spaded holes must fight their way into the compact subsoil which has never been disturbed, whereas when planted in a dynamited hole the ground being thoroughly broken up under the surface soil makes an easy path for the roots so that they spread out and have a large area from which to draw water and plant food.

A little thought will show the reason why dynamiting is so beneficial in tree planting. The principal plant food is water and fertile elements of the soil must be absorbed in water before they can be absorbed by the terminal roots. Hence the larger the area throughout which these terminal roots are spread, the greater the amount of moisture the tree can draw on and the greater the amount of water and plant food it can obtain.

This also explains the reason why dynamiting the soil between rows of old or failing fruit trees renews their vigor, because most of the water is taken up by the terminal roots which run out many feet from the trunk and the blasting creates water reservoirs in the soil between the rows.

The Amount of damage done by forest fires in Michigan in 1911 *is estimated by W. R. Oates, State Game, Fish and Forestry Warden, in a report just made public, at $3,567,483.68. Far the greatest part of the loss occurred in lower Michigan counties, as conditions in the upper peninsula last summer were not favorable to forest fires, and this region escaped with a light toll of damage.*

THE OHIO STATE UNIVERSITY FORESTRY CLUB. NOTICE MISS MARIE DUN, THE ONLY GIRL FORESTRY STUDENT IN THE UNITED STATES.



A CORNER OF THE OHIO STATE UNIVERSITY CAMPUS NEAR FORESTRY BUILDING.

FORESTRY AT THE OHIO STATE UNIVERSITY

By PROF. C. H. GOETZ

OHIO was one of the first States that lead in the movement for the conservation of our forest resources. As far back as 1855 some of her leading citizens like Dr. John A. Warder, E. E. Barney and others were known nationally as promoters of forestry.

Since that time Ohio has been one of the leaders in State forestry work. While up to 1909 she has failed to establish a chair of forestry at her University and Agricultural college, yet for many years forestry instruction had been given in connection with horticulture.

The Ohio State University is situated at Columbus, Ohio, about the center of the State. The University is well equipped for giving the student, thorough training along all lines of work, because the Agricultural college is at the same place and under the same management, so that the university student can get the benefit of the agricultural college work and the Agricultural college student the work of the university, making of all well-trained and rounded out students.

In this way the forestry student is able to get a solid, sure substantial foundation for all his subsequent technical and practical work.

The faculty of the forestry department consists of a professor in charge and two assistants to take care of the technical subjects and a large corps of professors of the university and agricultural departments to give the scientific and special work of the auxiliary studies.

The forestry course as given in four years, and as placed into the curriculum of the University a few years back consists of all the elementary basal subjects preparatory to forestry and includes all the subjects of technical and practical forestry as taught in all of the most prominent forestry schools, like Michigan and Yale.

The whole four years' course is designed to give the student all the necessary forestry education and yet to leave room for other auxiliary studies, so as to make the forestry student an all-round well-fitted-out man, capable to cope with any situation that he may meet when going out into the field of work.

The work in the courses has been combined into as few courses as possible, rather than to spread it out in a spread eagle fashion so as to make it look large or extended, and to have it overlap.

To give to the student as much as possible all the practical work, that can be given at a school has been the aim in the making of the course of studies. For this purpose there has been established a good-sized nursery, in connection with the virgin stand of timber still standing on the University

grounds. The campus or school grounds comprising some three or four hundred acres has on it over one hundred different species of trees for study along forestry and botanical lines.

During the summer months employment is found for the students in the U. S. national forests, the State forests and the lumber camps of the country.

While the forestry course as given here gives primarily the work required for a thorough training in forestry along all technical lines, yet secondarily it also provides a good foundation for other courses, such as civil engineering, botany, agriculture, horticulture, chemistry, entomology, zoology, geology and others, so that with very little extra work a forestry student may fit himself for any other vocation in life.

That the forestry school is successful is vouched for by the fact that some of her graduates are holding State Foresters' positions, and others are in private and U. S. Forest Service work.

VERMONT'S MEETING

AT the business meeting of the Vermont State Forestry Association recently Hon. Allen Fletcher was elected President to fill the vacancy caused by the death of Ex-Governor Proctor. Mr. Fletcher has long been an active supporter of the forestry movement in the State and expressed himself as a firm believer in the policy of the State investing a certain amount of money each year in the purchase of State forests. The other officers elected were: Vice-Presidents, Hon. Charles Downer, Sharon, and Hon. W. J. Van Patten, Burlington; Secretary and Treasurer, Mr. Craig Burt, of Stowe. The Executive Committee consists of Hon. Joseph De Boer, of Montpelier; Mr. Charles Greene, of White River Junction; General Clarke C. Fitts, of Brattleboro; O. L. Martin, Plainfield, and A. F. Hawes, Burlington.

At the evening session the chief speaker was Professor H. H. Chapman, of the Yale Forest School, who gave a very interesting and instructive address on "The Relation of State Forests to Farming." Mr. George Chedel, Superintendent of the International Paper Company, told of the extensive forestry work now being carried on by his Company in Vermont and New Hampshire. He told of the nursery in Randolph where a large supply of seedlings is being raised for planting on the cut-over lands and of the improved method of cutting, following the markings made under the direction of the State Forest Service in Vermont. Mr. Hawes, State Forester, discussed the question of forest taxation and suggested a bill along the line of the one advised by the Wisconsin Commission but to apply only to plantations. This bill would tax planted land not to exceed $3.00 per acre and make a ten per cent tax on the gross value of all stumpage when cut.

The Association has just issued a bulletin of its proceedings for 1911. It proposes hereafter to hold, in addition to the annual meeting, a summer field meeting in some forest which is being managed on forestry methods. A good many new members have recently joined the Association and its prospects for future usefulness seem very encouraging.

A PATH THROUGH THE VIRGIN FOREST LAND ON THE OHIO STATE UNIVERSITY CAMPUS.

DOCTORING UP A SYCAMORE GIANT WITH CONCRETE AND CEMENT.

THE JOB WELL DONE WITH THREE WAGON LOADS OF CONCRETE AND CEMENT TO FILL THE HOLLOW.

LODGE OF O. M. BILHARZ AT TENDERFOOT LAKE, WISCONSIN.

Photo by Dr. Hugh P. Baker.

FIELD FORCE OF PENNSYLVANIA CHESTNUT BLIGHT COMMISSION AT A SHORT COURSE, PENNSYLVANIA COLLEGE.

BLIGHT COMMISSION INSTRUCTION

By PROF. HUGH P. BAKER

DURING the week of February 26th to March 2d, Mr. S. B. Detwiler, Executive Officer of the Pennsylvania Chestnut Tree Blight Commission, his field superintendents and twenty-four of the field agents gathered in the Forestry Building at Penn State for lectures and demonstrations in Forest Pathology, Soils, Entomology and Forestry.

Professor H. R. Fulton, Pathologist of the Experiment Station, told the men of the nature of fungi and their relation to other plants. How natural conditions may aid or check the extension of a fungus and of the common methods of combatting fungi. An especial study was made of the Chestnut Blight Disease (Diaporthe parasitica Murrill) and the men were shown the different spore forms and their development both in the field and under the microscope.

In the work in Entomology, Professor W. R. McConnell described the development of an insect and showed how they may be instrumental in spreading the spores of fungi. The importance of bird life in checking extension of insects was explained and beneficial birds were shown and described. The men were unusually well acquainted with the common birds.

Professor C. F. Shaw, who is carrying on a soil survey of the State, told of the origin and nature of the various soils of Pennsylvania and touched upon the influence of soils upon tree growth. The importance of protecting the soil from erosion and baking, was brought out. Practical suggestions were given for preventing the washing of soils from steep slopes.

A forenoon was spent with Professor J. W. Gregg, Landscape Gardener, who gave a demonstration in pruning trees of different sizes and how wounds should be treated to prevent the entrance of spores of fungi. The men are being asked constantly as to methods of pruning trees infested with insects and disease and told of hearing many queer theories as to pruning.

The members of the Department of Forestry gave work both in the class room and in the field in rough methods of measuring and estimating timber; the structure and market forms of timber and ways of increasing durability. Some simple methods of management were discussed and applied to woodlands in which chestnut was dying out. The best trees for planting in various situations were described and estimates of cost of planting and returns were given.

The field force of the Commission is made up of an attractive and enthusiastic lot of fellows of all ages from recent high school and college graduates to self trained men past middle age who have had long experience in the woods.

During the past winter, while it has been difficult to work in the woods, the Commission has been doing a splendid line of educational work throughout the State. Meetings and demonstrations have been held in school houses, grange halls and city buildings throughout the eastern and central portions of the state. The people are showing a surprising interest in the work of the Commission and in forestry and whatever the results of the efforts to check the blight may be there is no question but that the work of the Commission will have a tremendous influence in developing Forestry in Pennsylvania.

LUMBERMEN AND FORESTRY

THE REPORT OF THE FORESTRY COMMITTEE AT THE NATIONAL WHOLESALE LUMBER DEALERS' ASSOCIATION MEETING IN LOUISVILLE, MARCH 6 AND 7

READ BY W. C. SYKES.

THE year has been one full of interest with conservation still the keynote of all discussions, lectures, or proposed legislation with reference to forestry. The term conservation in its true sense, i. e., to use wisely and not tie up what we already possess, is being better understood and all are working toward this end in so far as conservation does not conflict with commerce and increase cost of production. Conservation methods in the larger sense are something which cover perhaps a period of time much longer than the life cycle of a human being and for this reason they must often be taken up by the Government either Federal or State or both. Right in this connection we wish to call your attention to some proposed legislation in the Empire State.

The proposed legislation in New York is probably the most drastic of any law that has yet been suggested. Although the proposed law will effect directly but a part of the State of New York should it become a law, it is of great significance to all lumbermen, for if it passes it will establish a principle which might affect the lumber and timber interests all over our country. This principle is that a state may control and regulate the cutting of all timber on private lands and prohibit the cutting by a diameter limit without compensation to the owner of the land for the timber which he may not cut. This, it is maintained, can be done under the police power of the state.

THE PROPOSED LAW

The proposed New York law reads thus: "To the end that the water supply of the state may be conserved, the forests protected, and the public interests safeguarded, it is herein provided:

"That no soft wood timber, less than eight inches in diameter, breast high, growing upon any wild, forest lands within the towns specified in section ninety-seven of this chapter shall be cut without the written consent of the Conservation Commission, first obtained."

Right here I might say the towns referred to include the Adirondack Mountains, the Catskills, and some land beside these sections being the timber sections of the state, "which consent shall be evidenced by a resolution duly adopted by said Commission, and entered at length in its book of minutes; and such Commission may *make rules* and regulations to control the cutting and removal both of the timber and trees prohibited, and the timber and trees permitted, to be cut under this section."

Another section of the proposed law provides:

"That the Conservation Commission may require land owners to dispose of their slashings as the Commission 'may direct.'"

If this is not done after it has been ordered the Commission may have the work done, and the expense "shall be a lien upon the land on which they are situated, enforceable as liens for the improvement of real estate are enforced."

THE LUMBERMEN'S ATTITUDE

Were such legislation as this to pass the results might be extremely burdensome to the lumberman. These sections put so much power in the hands of the state and leave so little to the individuals and corporations owning timber land that it seems under some circumstances the state would be directing and managing the entire woodlands department of a business, and this would be possible in every case if the state cared to exercise its rights. Lumber and pulp interests have opposed this legislation on the ground that it is unconstitutional since it takes away property without due process of law. A recent decision of the Supreme Court of Wisconsin upholds this position.

Right along this line it is interesting to find that lumbermen, not knowing about these proposed New York State measures, suggest as a good method of conserving the forests that laws should be made regulating the cutting of timber by lumbermen, because the lumbermen are in the best position to bring about practical reforestration. The objectionable features are, however, to be eliminated by special tax so that the lumberman can carry his lands and not be at serious expense, and a bonus is to be paid lumbermen producing timber up to a certain size.

REFORESTATION APPROVED

Your Committee is in hearty accord with any regulations which will bring about reforestation: We believe in state regulation of cutting where it does not take away any element of value or take the control of directing the policies of the woods department out of the hands of the lumbermen. We believe that men who have spent their lives in the woods studying methods of operation are better equipped to handle this than are the Government officials no matter how well they may be trained. We do approve of coöperation between operators and State and Federal officials so that best methods may be adopted, but believe a property owner should be entitled to look after his own property. The subject of state control of private cutting is a large one and will no doubt come up again. In this limited space we cannot deal with it further.

Canada, in dealing with her lumbermen, is very different from the United States. Her policy is to keep the forest land intact with the exception of burned-over lands. The timber on these burned lands is sold to operators,

but the cutting is restricted to twelve inches on the stump in the case of green timber. This practice has been in vogue since nineteen hundred and two. Most of the operators in Canada own their own timber lands under a lease, but are not restricted in cutting, except what has been sold since 1902, as described above. Dr. Diver, of your Committee, believes this restrictive policy to be wrong, as timber land which is burned has all of the trees burned, as a rule, so this twelve inch restriction does practically no good. He also reports that in Northern Canada the cut-over lands are being retimbered by a young growth of pine which has sprung up of itself. This would go to show that natural reforestation brings good results; it is undoubtedly cheaper.

FOREST FIRE PROTECTION

The greatest enemy of the forest is fire. If we can overcome fire hazard, we can let the forest do its own planting with good results. This statement is only general, for there are places devoid of seed trees where planting must be done. We are all familiar with the causes of forest fires, and the preventive measures—such as roads, fire lines, telephones, look-out stations, regulations as to campers, fire patrol, etc.—but, unfortunately, because of the inevitable slash which must follow a cutting, the lumbermen have been held responsible for some fires, even though these precautions are taken.

If we can eliminate the slash, we get rid of one of our greatest menaces. Can this be done at a profit, or without incurring loss? Obviously this is impossible with all the finer twigs and limbs; but in the case of the larger limbs and branches, butts, etc., it seems this could be done even profitably. Fire wood, chemical wood, pulp wood, and various other uses should consume a lot of the dangerous slash, and what remains would be the material that would rot quickly, so that if fire could be kept out for a few years the danger would be greatly reduced. This is one of our big problems today, and it must be met. Forest products must be had by all, and in order to insure this in the future much of the land must be productive of other timber crops. Planting from the seed or seedling is slow and costly, and on land which has been burned over the soil is often burned also, so that there is very little chance for any new growth. This all leads back to our first proposition that fire must be kept out and then natural reforestation can be looked for, and the saplings and young trees which today are regarded as of little value will have an opportunity to mature.

Why plant seeds when we already have trees half or two-thirds grown which, if protected, will mature and be of use in much less time than will seedlings and thus do away, to a large degree, with the risk of young trees dying, for their mortality is great as compared with older trees. We, therefore, would recommend that every precaution be used to keep fire out of cut-over timber lands, and also out of slashings, for these slashings and cut-over lands must bear timber again; and we urge the utilization of the woods and debris usually left in slashings.

In some cases, the finer twigs and brush might be burned to good advantage. There is great opportunity and need for new methods along this line, and a greater degree of utilization of the debris of slashings. One measure which would aid greatly in keeping fires in slashings from spreading into green timber is to fell all trres along the line between the land to be cut and the other land, so that they will fall in the land cut, and their tops will not be in the green timber of the land to be left. This would put a fire line around the slash at practically no additional expense to the operator.

CHESTNUT BLIGHT SITUATION

Of late, we have heard much of the chestnut blight. The condition is serious. The blight, or chestnut bark disease was first noticed near New York City in 1904. At the present time it is in Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and West Virginia. The total loss from the disease is now estimated at $25,000,000.

The disease is caused by a fungus, and works in the inner bark. It gradually rings the tree and causes its death. This disease is like a germ disease, and it is caused by spors which get at any injury to the bark of a tree and soon infect it. Borers' tunnels are the most common entrance places for spores.

To combat this disease is a problem for the Government and not for the lumbermen. Lumbermen, of course, should coöperate. The bark of infected trees must be destroyed. Infected sections must be isolatd, and the bark of trees destroyed, or all our chestnut trees will go. Up to the present time no way of curing an infected tree has been found. Obviously this must be taken up by the various states concerned, and the Federal Government. The United States Department of Agriculture has already put some study on the subject. Pennsylvania has established a "Commission for the investigation and control of chestnut tree blight disease." Twenty-five thousand dollars was made available at once, and $250,000 more has been appropriated for this work. If the disease cannot be isolated in sections and gradually stamped out, it may be necessary to use up all our chestnut as soon as possible, unless some remedy is found, and then set out trees and start our chestnut forests all over again. We hope the situation will not become so serious as this; but the outlook is not encouraging. The State of New York, in its proposed legislation, authorizes the appointment of a Forest Pathologist.

However, the proposed law gives the Pathologist so much power that he could make trouble and expense for the timber holders by requiring them to cut and remove or destroy infected or diseased trees, no matter how remote they may be located. Pennsylvania already has a State Pathologist and good results are being secured. The chestnut blight is the most serious problem confronting the department at the present time. Tree diseases are serious, especially when they assume the dimensions of the one just considered.

They demand our attention. One simple recommendation which would help in keeping out fire, as well as disease, is the cutting down of rotten or dead stubs. These are very frequently diseased and will infect the neighboring trees, and in case of fire, we find the burning stub is often the one cause which may spread a fire quickly, as the fire runs clear to the top of the stub and then burning pieces of the rotten wood are carried by the wind often comparatively long distances.

THE LUMBERMEN'S POSITION

We have attempted to call attention to some of the present day problems before the timber owner and operator. Our information is localized, but in general might apply to all timber holdings. The present effort to subject the timber owner and lumberman to state control over his cutting, without concession in taxation or compensation for lands and timber tied up, which amounts to confiscation, is probably the most serious step that has yet been attempted. This principle, once established, would be felt by all. If it is good business and economy to leave timber standing, so it may grow larger and bring about natural reforestation, the lumberman will fall in line. If the Government will not trust the lumberman this far, then let the Government buy the land. What is good forestry, we believe is good business and economy. Education is what we need and seek, and not coercive measures.

NORTH CAROLINA FORESTRY ASSOCIATION CONVENTION

By FORESTER J. S. HOLMES

A DECIDED awakening of public opinion was manifested by the large attendance of interested delegates at the second annual convention of the North Carolina Forestry Association recently held in Raleigh, N. C. This association, which was organized a year ago, with the object of promoting "the protection of the forests of North Carolina from fire and from destructive insects, and promoting their perpetuation by wise use and by the reforstation of cut-over and abandoned lands," has, by the appointment of vice-presidents in every senatorial district of the state, laid a foundation for forestry activity which has already brought far-reaching results.

Governor W. W. Kitchin welcomed the delegates and expressed his deep interest in, and hearty sympathy with the movement. The president, Dr. D. A. Hill, president of the State Agricultural and Mechanical College, in his address advocated a campaign of publicity as a means to secure the election of interested representatives for the next General Assembly. He said every member should make a point of reporting to his local paper each forest fire which occurs in his county, approximating the damage done and calling attention to the fact that such fire could have been avoided had certain pre-

cautions been taken. Public meetings to discuss forestry questions were also advocated.

In the unavoidable absence of Dr. A. D. Hopkins, Mr. E. B. Mason, of the United States Bureau of Entomology, gave an address on on the Southern Pine Beetle and Its Control. This question is one of vital interest to the people of the state and already two local associations have been formed to coöperate with the United States Bureau of Entomology in dealing with it.

The paper by Mr. J. G. Peters, Chief of State Coöperation of the United States Forest Service, dealing with coöperative fire protection under the Weeks Law, brought out the value to North Carolina of the offer which the United States Department of Agriculture is making to the various states. Probably a larger number of navigable rivers have their headwaters in western North Carolina than in any other equal area in the United States, and yet the attempt of the Federal Government to assist in protecting such streams cannot be put into force in North Carolina because no appropriation is made by this state for fire protection. A united effort will be made by the Forestry Association to obtain such legislation next year as will allow the state to receive the assistance offered by the United States Department of Agriculture under the Weeks Bill.

The question of state-wide stock law cannot be separated from a discussion of forest protection, and the paper by the Hon. Hugh MacRae, of Wilmington, on The Stock Law and Forest Protection was timely, and elicited a great deal of favorable comment.

The resolutions which were passed embody the sentiments of the Association and pretty well covered the subjects discussed at the two meetings.

In addition to the resolutions, the Association asked for the appointment of a legislative committee, which is to draw up a forestry bill for the consideration of the next legislature. This committee will represent all phases of the forestry movement, and a bill endorsed by it and subsequently by the whole association, should stand a good chance of becoming law.

The officers elected for the ensuing year are: President, Mr. E. B. Wright, president of the Butters Lumber Company of Boardman, N. C., and Secretary-Treasurer, Mr. J. S. Holmes, Forester of the State Geological and Economic Survey, Chapel Hill, N. C.

THE 1911 INDEX

The 1911 index for AMERICAN FORESTRY is now ready and subscribers may have it mailed to them by writing for it.

TWO PRIVATE FOREST ARBORETUMS

AMERICAN FORESTRY readers who have been interested in the proposed forest arboretum at Letchworth Park will undoubtedly be glad to hear of two already existent forest arboretums of the same kind, though not the same extent, the little trees of which are now eight to ten years old, which are parts of private estates in this country. One of them is at Potowomet, Connecticut, on the estate which has been so notably connected with the past history of forestry in this country under the name of the "Russell Estate," and which now belongs to Col. R. H. I. Goddard, to whose progressive interest and enthusiasm the undertaking owes its success. The other is a part of the planting on the estate of Mr. Percy Rockefeller at Greenwich. Both are the work of Mr. Theodore F. Borst, Forest Engineer of the American Forestry Company.

The Russell Estate has for nearly forty years been one of the most successful examples of private forestry in this country, and its various plantings have been partially inspired from the first by the recommendations of Prof. Charles Sprague Sargent of the Arnold Arboretum. When Col. Goddard decided to continue and complete the old plantings, Prof. Sargent recommended that the services of a trained forester be called on to unify the existing stands, and to carry the old planting over into a harmonious relation with the large new stands contemplated. Mr. Borst had for some held the idea that a living tree museum should be established, for an opportunity to study species and habits of forest trees in a planted forest, from the point of view both of utility and beauty. This seemed an excellent opportunity to do so, and the idea appealed to Col. Goddard, who saw in it a fitting continuation of the pioneer work of Mr. Russell. Accordingly, the completion of the reforestation, involving the planting of 200,000 trees the first two years, and another 100,000 this coming year, included the establishment of such a forest arboretum. It was laid out in such a way as to unify the existing blocks, and its object was to develop all the species which would flourish well in that locality. It contains nearly seventy-five distinct species in pure stands and in combinations, and is undoubtedly the first forest arboretum of its kind in America, and probably the first in the world.

All the species, in blocks, are to be labelled by indestructible plates, which Col. Goddard is having made, a feature which will add much to the permanent value and interest.

The planting at Mr. Percy Rockefeller's at Greenwich was a close second in time. Mr. Rockefeller took a great interest in the scientific side of the undertaking, and felt, too, that it would add much to the beauty which was the first aim in the whole design in that instance. His arboretum has in it thirty-nine species.

Both Mr. Goddard and Mr. Rockefeller are exceedingly fond of trees and deeply interested in forestry in its application to private estates. They will be glad to permit any student of forestry to visit these arboretums on application to their superintendents.

TIMBERLAND OWNERS AND FORESTRY

By W. R. BROWN

THERE has been widespread and general co-operation in New Hampshire between the Federal, State, Association and Industrial interests, and a mutual attempt to find the proper method of forest protection, operation and renewal which would work out for all interests the widest practical and lasting benefit. In this work the timberland owners have done their fair share, and I will explain such methods as are meeting with their hearty support at the present time, and the degree of coöperation in others which I think appears practical to them. As the many associations of timberland owners which have sprung up the past three years, control a considerable share of all the timber, their coöperation should be most urgently desired to obtain immediate results.

Now it is necessarily a practical problem with them, and their first question is inevitably "does it pay"? In other words, while equally interested with all good citizens in the future of the country and subscribing thereto liberally out of taxes, they are chiefly concerned in assisting prosperity by bending their energies to the advance of their particular business, and in securing the proper base for a successful future by seeing that there is no present loss or disaster. The whole problem is, I think, to persuade them, when we have done this honestly for ourselves, of what is best for them in the long run, helping them to maintain and build up their business meanwhile. This is particularly so when we consider the advantage of maintaining a strong international position among other nations, which is largely dependent on the position we take among one another at home.

WHAT TIMBERLAND OWNERS WANT

The following are some of the practical points which appeal to the timberland owner in forestry:

First of all, fire protection, of which they have been woefully lacking in return for taxes paid in the past, and where they can see clearly the benefits of coöperation both among themselves and with the State and Government, and it is along these lines that the first timberland owners' associations have been formed, and the greatest energy is being put forth.

Following this come study of the prevention of waste in the cutting and marketing of timber, the practice of giving closer inspection to logging operation; study of scientific management in the handling of logs; and the encouragement of new wood-working industries for using up more closely the products of their lands. Such work as is being done by the Forest Products Laboratory in Madison, Wisconsin, is of the greatest value.

Another point is the question of taxation, which although not now generally acute, might become so, as the present laws are theoretically unjust, but, due to the good sense and inherent justice of the average tax assessor,

have not been carried out stringently; so that, the solving of this question wisely would meet with their hearty approval.

Another point, of which there is an increasing practice going on among the timberland owners, is the judicious cutting of their trees for the propogating of a future growth, principally among the large owners who have mills to conserve or others who wish a continuous investment and return.

Planting is principally going on among railroad companies for railroad ties and among the farmers whose labor is not a cash charge and by large owners who have both very favorable land conditions for planting and long time investments to secure. It is very doubtful, however, if private owners can afford to plant trees to any extent for some time, unless the markets improve or timber becomes more scarce than at present, which is not imminent in view of the fact that large bodies of uncut timber can be purchased at low prices in Canada, and in the United States, and markets will be steadied by the constantly improving means of communication such as the Panama Canal will furnish.

On the opposite hand, another point which I think is appealing to the far-sighted timberland owners is, the advantage in the Federal and State ownership for the reason that the State can carry on and develop many tracts into a future growth, create future supply, and be a steadying influence upon future markets.

In fact, all forestry, if looked at in this light, will be to the timberland owners' future advantage and good, as well as to the good of the country at large. But it is equally true that its growth must be slow and sure and achieved step by step and the present worth of each step must be demonstrated and proved to meet with the timberland owners' hearty support, which I think they are in a frame of mind to more than willingly give.

A FOREST THAT PAYS $40 AN ACRE YEARLY

By GEORGE W. KEHR

THERE is a tract of timber containing 90 to 100 acres near Port Matilda, Center County, Pa., owned by Christian Sharer, that has not been "hogged" over during the last fifty years. It covers a steep, rocky mountain-side, and consists of chestnut, oaks, white pine, and a few other varieties of hard and soft wood.

During the winter of 1911-12, the ripe timber, on five average acres of this tract was cut—telephone poles, railroad ties, mine props and a little saw stuff. The 700 thirty to fifty foot chestnut poles taken out are worth $3,000 f. o. b. cars. Cutting and hauling them cost $350. Fifteen cars of small ties and props are worth $225 net. We have no figures to show the number of railroad ties and quantity of sawed lumber cut, but there are 200 to 300 ties and several thousand feet of plank.

The chestnut that was cut had reached the "hypermature" stage. Ninety per cent of these trees were dead at the tops. All the other trees cut were either ripe or were crowding and needed to be removed. The stand left is as

perfect as could be wished—trees eight inches in diameter and smaller, properly spaced, and of right mixed kinds.

Fourteen and fifteen years ago every tree of marketable size and kind was cut from this same acreage. That crop of timber was more valuable than the present one. In fifteen years (by 1927) fully as big a crop should be cut as the one of 1912, still leaving the stand of growing timber perfect for the future.

The poles and bi-products of mine ties and props are the crop from the five acres for one fifteen year period, (forgetting the railroad ties and saw stuff). The net cash value of these poles and top-stuff is $28.75. *It figures* $38.33 *for each acre every year.*

Taxes and interest reduce this about 10 per cent—then the timber pays better than wheat, corn, oats, or any rotation of general crops on the best of land. The work required by the timber is less than a quarter of the amount necessary in farming those crops. On rich bottom land the timber growth would be much heavier than on this thin, high, dry soil. Proper planting and thinning of timber trees would increase the growth and the amount of marketable lumber considerably.

This timber area lies on a slope above the Sharer home. It increases the amount of water available all summer long over its own area and over a large area lying below it. Several springs at its lower edge are never failing. The August freshets flowing from its carpeted surface are as pure as June streams. Game in plenty makes its home among the trees, and the forest increases the beauty of the neighborhood.

In the light of these facts it would seem that many acres all over the country that were once cleared and are farmed or are lying idle now, ought to be growing timber—when otherwise waste land in natural timber, with no care beyond intelligent cutting, can yield almost $40 on an acre yearly, that land certainly should be in timber, and under proper management. Fifteen per cent of every farm in the country should be a permanent forest, no matter how good the soil, while on thousands of farms and on all unproductive land there is no excuse for anything else.

FORESTRY AND THE STATE LEGISLATURE

By W. B. GREELEY

Of the Forest Service

IN the course of my few years' experience, I have seen something of the development of the forestry movement, particularly in the Northwest, and I have become convinced that the critical point in the present stage of this great movement, the point of immediate importance, is the state legislature. It is a common saying, summed up in one of Mr. Pinchot's latest epigrams, that "forestry has succeeded everywhere except in the woods." We know that there are so many reasons for the backwardness of the private owners throughout the country at large in attempting the application of the

forestry principle to their property. We know that some of those reasons are within their control, that many of them are beyond their control, and that many or most of the factors beyond their control are within the control of the state governments and specifically the state legislatures.

I have seen, particularly in a number of western states, many instances of the gropings of men interested in forestry for wise state legislation. I have seen abortive attempts at such legislation. I have seen instances where certain elements in those states have exerted themselves to make the legislation proposed so extreme that it would fail of passage.

I have in mind particularly a law introduced in the legislature of Montana, the last session, which proposed, whenever the responsibility for starting a forest fire was laid at the door of a corporation, the President or Executive officer of that corporation should be subject to imprisonment for a minimum perid of six months. It was seriously proposed in that bill to enforce a provision of that character, and it is very obvious that there were interests involved which were working to make the proposed legislation as extreme as possible, so that it would fall of its own weight.

STANDARDIZING LEGISLATION

It has occurred to me, therefore, that one of the most effective things that the American Forestry Association might do would be to standardize wise forest legislation for states, at least the fundamental principles of wise forest legislation, without attempting, of course, to determine how the principles shall be applied under any one of a great variety of conditions.

I think that this is one of the most effective ways in which the members of the American Forestry Association can coöperate with the Forest Service. One of the features of the work of the Forest Service, a feature which is assuming increasing importance, is the critical study of state forest systems and of the legislation necessary to produce an effective state forest system. We can do much in collating, in publishing results of the various laws, and in showing what the different states are attempting to do, and something of the practical results accomplished in the various states. We can do very much in creating a favorable sentiment in the states, particularly in the states that are just now groping after the right kind of forest legislation.

It occurs to me that the American Forestry Association might do a very effective work by working certain standards and principles as to what constitutes the right kind of state forestry, and then using its members as missionaries to make these principles known and to secure their practical adoption and application under various conditions. We cannot attempt to do much at first. We must be willing to accept the half loaf in cases; we must be willing to adapt our ideas to rough and ready conditions.

EDITORIAL

THE Agricultural Bill has just passed the House of Representatives. It contains a reduction of over one million dollars from the present appropriation for the Forest Service, and this cut is made almost wholly from the funds available to prevent and fight forest fires. The current appropriation of $500,000 for building roads, trails, and telephone lines needed to call and get men quickly to the fires is reduced to $275,000, and of the emergency fund of $1,000,000 for fighting forest fires only one-fifth remains. The House, by a vote of seventy-four to seventy, restored the $225,000 cut from the appropriation for roads, trails, and telephone lines; but on the final reading of the Bill, the amendment for this increase was defeated.

These cuts are made in the face of the record of 1910, in which seventy-nine fire fighters and twenty-five settlers were burned to death in the National Forests, and twelve million dollars' worth of timber was destroyed; and in the face of full knowledge, that as the result of insufficient appropriation, the National Forests, which constitute about two billion dollars' worth of public property, are in grave danger of even greater loss from fire.

The protection of public property and of the lives of settlers, their wives and their children, as well as of the public servants within the National Forests, lies close to the public welfare. It is easy to malign the Forest Service, as certain members of Congress are accustomed to do. But it is much easier to malign the Forest Ranger than it is to do their brave and efficient work on the fire line. We must not let false economy further imperil the safety of public resources and the protection of human lives.

It is time for Congress to face the facts. Before the National forests can be made reasonably safe against fire, they must have ten times the present trails and six times the telephone lines now built. It has taken six years for Congress to appropriate enough money to build this small part of what is urgently needed. The standing timber alone on National Forests is worth not less than five hundred million dollars. In twenty years it will probably be worth well over one billion dollars. If Congress gave the Forest Service the five hundred thousand dollars a year it asks for, to build trails and telephone lines, it would give only one-fourth of one per cent of the value of timber standing to-day in the National Forests.

The preservation of this standing timber controls the preservation of stream flow, whose value is many times that of all the wood which the National Forests contain. The value of the range in National Forests which again is largely dependent upon forest preservation, is incalculable. The fees for grazing alone bring into the public treasury every year twice the appro-

priation asked for trails and telephone lines. Without these improvements the forests cannot be made safe, even with ten times the present patrol.

The one million dollars asked for actual fire fighting and cut by the Agricultural Committee to one-fifth that amount, is simply a fund made available for the use of the Forest Service in times of grave emergency. It may be less necessary than the money required to build roads and bridges, telephone lines, and trails. Unless the fires occur, this money would be neither needed nor spent. But should the need arise there could be no more criminal extravagance than not to spend it. It cost $900,000 beyond the appropriation of the Service to fight the big fires of 1910. If this money had not been spent, these fires would probably have wiped out the bulk of the forests of Northern Idaho, Montana, and Western Washington.

Fires have already broken out on National Forests in the Southwest as the result of the exceptionally light precipitation this winter. It would be hardly less unpatriotic and unwise to withhold money to equip troops against an invading army, than to refuse the appropriation needed to fight these fires and prevent the greater fires which may easily follow.

The Agricultural Appropriation Bill will soon be up in the Senate, and every friend of the National Forests is urged to raise his voice on behalf of adequate appropriation for protecting them.

The first forest fire for the year has been reported at the office of the Tahoe National Forest. Supervisor Bigelow reports that sixty acres of land on Squaw creek, in the canyon of the north fork of the American river, caught fire on February 24 and burned for two or three days.

Requisitions have been made by the Supervisors of 20 of the National Forests within the Second United States Forestry District, with headquarters in Denver, for 10,000,000 trout fry. Efforts of Colorado to restock high altitude streams and lakes will be greatly enhanced by the coöperation of the Forestry officials.

Twenty-eight forest service timber sales, some of them very large ones, have been in progress on the Kootenai National Forest during the winter. A number of sales are nearing completion, and the field force of forest officers who have been employed on the sales are beginning preparations for the coming season's field work.

REVIEW VOL. VI, NO. 2, PROCEEDING SOCIETY AMERICAN FORESTERS

This issue of the *Proceedings of the Society of American Foresters,* which appeared in October, 1911, contains a number of articles of particular interest to professional foresters. The opening paper, "The Essentials in Working Plans for National Forests," by Barrington Moore, states briefly the author's views as to what should be included in a typical working plan for a National Forest. A general outline is presented showing the arrangement of the topics to be treated in the working plan, with brief notes as to some of the more important of these. The paper is a very suggestive one and should serve to bring about further discussion of this important subject.

Another technical paper is one on "Seed Production and How to Study It," by Raphael Zon and C. R. Tillotson, in which the authors review at some length the efforts made by European foresters to solve the problem of seed production. They point out that but little accurate information concerning seed production has been obtained by these studies, and present a new method of investigation originally suggested by a Russian forester. Briefly, this method aims to determine the average amount of seed produced per unit area in a given forest type by means of sample plots whose seed production is accurately determined by the study of representative trees. The article deals in an original way with an important subject which has so far received comparatively little attention in this country.

Dr. B. Herstein, Technical Expert of the Tariff Board, under the title "Conservation and Chemical Pulp," discusses the possible utilization of sulphite waste liquors resulting from the manufacture of wood pulp. At present no use whatever of these liquors is made in this country, and they are simply run into the rivers which are becoming seriously contaminated by them. Dr. Herstein points out that a process has now been perfected by which this sulphite liquor can be converted into alcohol at a reasonable expense, and cites a plant in Sweden which now produces 300,000 gallons of alcohol per year from this source. The economic saving which this method makes possible is obvious, but perhaps its greatest value lies in doing away with the indiscriminate pollution of rivers by the waste liquids.

Forest fires are discussed in two articles: one by W. B. Greeley entitled "Better Methods of Fire Control," and one by I. F. Eldredge entitled "Fire Problem on the Florida National Forest." Mr. Greeley presents an admirable discussion of the entire problem of fire protection under the heads of patrol, communication, transportation, emergency help, equipment, and fire-fighting organization. Each of these subjects is thoroughly discussed from a practical point of view, and the conclusion is emphasized that fire-fighting is a matter of scientific management just as much as silviculture or range improvement. Mr. Eldredge points out very clearly the difficulties of fire protection on the Florida National Forest. His belief is that under present conditions complete fire protection is a hopeless ideal, and that the best policy is to protect all cut-over and experimental areas, and to burn the rest of the forest lands annually early in January when the surface fires are easily controlled. He emphasizes the importance of securing the cooperation of the settlers and of gradually extending the area protected.

One of the most valuable and timely papers in this issue is a bibliography of the Southern Appalachian and White Mountain regions, compiled by Miss Helen E. Stockbridge. This makes available for the first time an exhaustive list of the books and articles dealing with these two regions. The literature is classified under the following subject heads:

1. National Forest Movement; 2. Topography and Resources in General; 3. Botany; 4. Forests and Forestry: Forest Influences; 5. Water resources; 6. Climatology; 7. Geology; 8. Mines and mineral resources; and 9. Soils.

Altogether, this issue of the *Proceedings* is one of unusual interest.

S. T. D.

One thousand dollars a day will be put into circulation in northern California during the next fifteen years through the sale of a large tract of government timber which the Forest Service is now advertising for bids. The sale includes about 2,100 acres of excellent sugar and yellow pine on the Shasta National Forest. The estimates show that nearly 200,000,000 board feet of timber is included upon this area.

STATE WORK

Pennsylvania

At the annual meeting of the Pennsylvania State Foresters at Harrisburg on March 6 and 7, Pennsylvania, commended for the advanced position it has taken in conservation and in forestry management with its 972,000 acres of preserves, was warned to take the best protective measures possible against forest fires by Prof. Filibert Roth, of the University of Michigan, and F. A. Gaylord, of the New York Conservation Commission. Prof. Roth declared that stumps were monuments of ignorance and asserted that they could be made to yield handsome returns if properly handled.

Prof. Gaylord urged that the foresters be put to work to erect telephone lines, which, he said, had been done in his State at a cost of from $7 to $9 a mile, and which had proved of great value in calling men to aid in fighting fires.

William F. Dague, of Clearfield, talked on the protection afforded by taking out stumps and waste and the income produced therefrom; T. Roy Morton, Petersburg, on more rapid growth; Prof. E. A. Zeigler, Mont Alto, on early returns, and Harold E. Bryner, New Germantown, on clearing methods. In the afternoon the papers were by foresters, including John A. Bastian, Loyalsock; James E. McNeal, George H. Wirt, Lewis E. Staley, Harry A. Thompson and Forrest H. Dutlinger, who declared roads and markets should be studied, as the two went hand in hand, and who predicted that, with better roads, the State's income from forests would increase.

Much time was devoted to the business side of forest management in the papers of Foresters John W. Seltzer, Coburn; John L. Strobeck, Crosco; Homer S. Metzger, Logantown; Walter D. Ludwig, Boalsburg; John R. Williams, Rector, and D. H. Warfield, Milroy.

Former Congressman N. W. Wheeler and T. D. Collins, of Forest County, both of them lumbermen, spoke of the financial benefits, while former Mayor E. A. Weimer, of Lebanon, and Forestry Commissioner S. B. Elliott, recommended more planting and the extension of precautionary methods to prevent forest fires. Prof. I. T. Worthley and Joseph Illick, of the Mount Alto Forestry Academy, dealt with the question of management in reference to getting the best out of rangers.

California

There were 326 more forest fires in California during 1911 than during 1910, and 426 more than in 1909, according to a report by State Forester G. Morris Homans, in which he gives the area burned over, cost of fighting, etc. The total damage in 1911, however, was only a little more than one-fifth as great as in 1910, but somewhat greater than in 1909.

During 1911 there were 1,064 forests fires, against 738 in 1910 and 638 in 1909. The total damage during 1911 was $128,451.50 against $628,989.20 in 1910, and $100,000 in 1909.

The area burned over in 1911 was 55,182 acres of forest land and 227,102 open chaparral land; in 1910, 216,069 acres of forest lands and 303,394 acres of chaparral; in 1909, 76,730 acres of forest land and 279,539 acres of chaparral.

Wisconsin

With the view of developing a plan for the utilization of the millions of acres of cut-over lands in Wisconsin, the United States Government has decided to make extensive experiments in forest on the Sparta military reservation. The military reservation contains 20,000 acres, a large part of which is available for the experiments which are to be under the immediate direction of W. B. Piper, supervisor of the Marquette and Michigan national forests, and are to start at once. Pines from Northern Minnesota are to be planted principally.

The entire northern half of Wisconsin was until comparatively recent years, occupied by extensive pine forests, which have almost all been cut, and while much of the denuded land is valuable for agricultural purposes, a large part of it can be best employed for the development of new forests as soon as the method of handling and growing them has been well worked out.

Minnesota

A meeting of the representatives of Central and Northern Minnesota railroads was held at Duluth recently with W. T. Cox, the State forester, and other representatives of the State and National Forestry Departments. The meeting was for the purpose of discussing fire prevention and methods for accomplishing the best results. W. H. Gemmell, general manager of the Minnesota and International road, was chairman of the meeting.

The railroad men say that they will make it their business to give careful attention to fire prevention which costs the roads not only for property that may be destroyed and judgments procured by settlers, but the loss of vast sums in prospective freights by the destruction of timber by fire.

Michigan

That the Northern Forest Protective Association, organized in Marquette in the fall

of 1910, has accomplished much in preserving the forests of the upper peninsula and guarding against disastrous fires during the past year, was made evident at the first annual meeting of the Association, held in Marquette, Mich., recently.

The report of Secretary-Forester Thomas B. Wyman, of Munising, shows that the total loss sustained to property in the upper peninsula from forest fires during 1911, exclusive of regeneration and occuring after the establishment of the Association's patrol system, was less than $6,000. Of this amount a considerable portion was owned by non-members of the Association.

New Hampshire

A review of great results already accomplished by the Society for the Protection of New Hampshire Forests is presented in the tenth annual report. Much has been done to preserve the wonderful natural resources of the State, but more remains to be done. On the Society's program are:

Enlargement of the State forest areas.

Effective cooperation with Federal officials in the purchase of a National forest in the White Mountains.

Extension of properly managed town forests, as a source of continuous revenue.

Encouragement of an equitable system of forest taxation.

Education of woodland owners in a wise use of their timber with a view to future returns.

Stimulation of tree planting throughout the State and the creation of new forests to take the place of those cut off.

Iowa

Four vital agricultural bulletins and circulars have just been issued by the Iowa Agricultural Experiment station for general distribution. No. 127, "Spraying Practice for Orchard and Garden," is a complete compendium on that subject, written by Prof. S. A. Beach, head of the horticultural and forestry section of the experiment station. The bulletin describes all orchard diseases common to the Mississippi valley and tells how to fight them as well as the various pests that cut down orchard yields.

Colorado

The Colorado State Forestry Association held its twenty-seventh annual meeting Feb. 15-16. It carried out a good program and closed with a banquet on the evening of the second day which was made exceedingly interesting by the presence of the Presidents of the Colorado College, the State Teachers' College, the State Agricultural College and the State University. It will take those who attended a long time to forget the occasion.

Nine directors were elected, the same persons for the third time consecutively, one of the number, General Irving Hale, being seriously ill the Hon. John H. Gabriel was chosen by the other members of the board to serve in his stead. The board now stands as follows: A. Lincoln Fellows, J. H. Gabriel, Mrs. Helen L. Grenfell, W. A. Hover, Jacob Fillius, Mrs. Louise Brooks, C. K. McHarg, E. C. van Diest and W. G. N. Stone.

Kentucky

For the past six years Hon. W. H. Mackey, of Covington, Ky., has been endeavoring to have the State Legislature pass a bill creating a Forestry Bureau and he has recently succeeded. The Bill is now in the hands of the Governor and it is expected will be approved by him. While the appropriation is not large it will doubtless grow year by year. Anyway Mr. Mackey has got the work started and he deserves a great deal of credit for the effort that he has made. The Forestry Board will consist of five members, and the State Forester must be a graduate of a forest school and a technically trained forester. The appropriation is to be $20,000.

Ohio

George W. Miller, chairman of the committee on agriculture of Ohio, writes that his committee has sent the following rough draft of a proposal to the Constitutional Convention which will shortly consider it:

"The general assembly may, in order to encourage the propagation, planting and cultivation of forestry, pass laws exempting from taxation, in whole or in part, wood lots or plantations devoted exclusively to the growth of forest trees.

"The general assembly may make further provisions granting the State authority to reforest and hold as forest reserve such lands or parts of lands that may be forfeited to the State or that may be acquired by the State."

Maryland

A bill has been introduced in the Maryland State Senate by Senator Benson calling for an appropriation of $10,000 annually for carrying on the work of the State Board of Forestry, under the direction of the State Forester, and a special appropriation of $6,000 for publishing the forest reports and forests maps of the several counties of the State. This is an increase over what has been heretofore appropriated, but this amount is required to meet the growing needs of the work; the need for increased fire protection alone, will require $4,000 annually.

While the Agricultural College, the Experiment Station, the Farmers' Institutes, the Granges, the Farmers' Clubs and all the other agencies are working for the improvement of tilled lands, there is *only one*—the Board of Forestry—working for the improvement and protection of the woodlands, although they represent more than one-third of all the State's land area and are so widely distributed as to be represented on practically every farm, either by woodlot or timber tract.

New York

For the purpose of securing better forest management, the Conservation Commission of New York State is perfecting arrangements to examine about thirty thousand acres of forest lands owned by the International Paper Company in Township 6, J. in Brown Tract, near Big Moose in Herkimer County. While this work will be performed under the direction of the Conservation Department, the expense will be borne by the Paper Company, which has expressed a desire to coöperate with the Department in practical conservation of the forest lands which it owns.

The Department will prepare a map of the area which is to be lumbered, showing the location and extent of various types of forest growth and the quantity of timber. On this data as a basis, the scientific lumber operations will be planned. The results will be not only a prevention of waste, but the perpetuation of the forest growth for the future.

The International Paper Company owns a larger area of lands in the Adirondacks from which it secures pulp wood supplies for its paper mills, and for many years the concern has been cutting timber conservatively, taking but few trees under twelve inches in diameter, leaving the smaller trees for reproduction and future supply of timber. The company desires to still further improve its lumbering methods and has sought the advice and assistance of the Conservation Commission, which has readily responded inasmuch as one of its duties is to conserve the forests protecting the important watersheds of the State.

Connecticut

In a recent talk at New Britain, Conn., State Forester Samuel N. Spring made an urgent plea for more strenuous efforts to protect the forests against fire. He told graphically how 1,000 fires last year had laid waste 50,000 acres of timber land. He brought home to New Britain a realization of its duty in the prevention of such waste and it was gratifying to learn that that city has paid more attention to fires in its surrounding woodlands than many Connecticut municipalities. In each city the fire chief is *ex-officio*, fire warden and because of manifold duties many fire chiefs, according to the speaker, have spent little effort along this line.

South Dakota

To provide for carrying out an agreement under which South Dakota school lands will be exchanged for National forest land of equal area and value, President Taft has signed a proclamation which makes it possible for the State to select immediately 60,143 acres of land from the Harney and Sioux National forests. This will permit of indemnity selection by the State in place of school lands lying along and within the boundaries of the Black Hills National forest, which will become part of the forest.

Indiana

Because approximately 2,000,000 acres of land in Indiana is virtually lying idle, which might be producing timber of highest value, the State Board of Forestry has issued a bulletin to Indiana farmers and owners of woodlots impressing the need of systematic and intelligent culture of the Hoosier woodlot.

Florida

Dr. Raphael Zon, of the Forest Service, on a recent trip to Tampa to investigate the culture of eucalyptus there, said that the experiment, although not a spectacular success, is scientifically valuable as it shows the conditions under which the trees will thrive and establishes beyond a doubt that eucalyptus trees will flourish as well here as anywhere else in the country if given the proper care. In the experiments tried on Grand Central extension, there was practically no attention paid to the trees beyond planting them. They were set just before the dry season of last year and most of those which died succumbed because of lack of moisture. This was shown conclusively by the fact that in the lower ground where the moisture accumulated and remained much longer than in the high sand, the trees thrived fairly well.

Oregon

Oregon is going to have better forest fire protection this year than ever before in its history. It will have a larger appropriation from the Federal Government, greater help from individual timber owners and, it is believed, more liberal assistance from the State itself, judging from the expressions at the annual meeting of the Oregon Forest Fire Association. G. H. Cecil, in charge of the Government Forest Service in the Portland district, stated that the Federal Government had promised $10,000 for fire protection the coming season, or $5,000 more than last year. State Forester E. A. Eliott stated he believed the State would probably see it good business to appropriate $100,000 for forest fire protection for the next two years, instead of $60,000, the amount appropriated for the purpose during the past two years.

NEWS AND NOTES

Lumbermen and Forestry

The members of the National Wholesale lumber Dealers' Association held a most enthusiastic meeting at Louisville, Ky., early in March, at which, following a report of the Forestry Committee, published in this issue, and an address by P. S. Ridsdale, executive secretary of the American Forestry Association, explaining what the organization is doing, resolutions endorsing the work of the Association were adopted.

These were as follows: *Resolved,* That the National Wholesale Lumber Dealers' Association heartily indorses the efforts of the American Forestry Association to secure better State and national fire protection of the forests. Also the effort to protect the head waters of streams and to secure a satisfactory system of time and land taxation and to advocate the use of woods and wood products; and be it further

Resolved, That the members of this Association lend their support to the American Forestry Association and to encourage subscriptions to its magazine, AMERICAN FORESTRY which is its medium of publicity and education, and be it further

Resolved, That this Association indorses the bill now before the Congress of the United States appropriating the sum of $80,000.00 for the the scientific investigations and eradication of the disease commonly known as the chestnut tree blight, and be it further

Resolved, That any legislation which seeks to regulate the cutting of trees by prohibiting the cutting of all trees below certain specified diameters would be deemed to be adverse to the best interests of the lumbermen, unless such legislation recognizes the time honored rights of property by providing that compensation be made by the State to the owners of the trees which fall within the provisions of the proposed legislation.

Protecting the Forests

At a meeting held recently in Montreal, the St. Maurice Valley Forest Protective Association was formed, having for its object the protection from fire of the timber lands of the St. Maurice River Valley. This important river supplies large amounts of power for Montreal and Three Rivers by means of the Shawinigan Falls and also for the largest pulp and paper companies in this province.

Lookout stations will be established on high hills from which fires can be detected, and these will be connected by telephone with the nearest settlements, so that help can be obtained. Telephone lines and trails will be built and fire fighting tools placed in convenient locations. Educational work will be undertaken to teach the settlers and farmers the value of the forests and the necessity of protecting them.

The officers elected later at Quebec, are:

President—Mr. Alex. MacLaurin, of Montreal, representing the Union Bag and Paper Co.

Vice President—W. R. Brown, of the Quebec and St. Maurice Industrial Co.

Directors—Messrs, R. S. Grant, St. Maurice Lumber Co.; Ellwood Wilson, Laurentide Pulp Co.; Frank Ritchie, Wayagamack Pulp and Paper Co., and H. Biermans, Belgo Pulp and Paper Co.

Following the election of officers a banquet was given at which Mr. W. R. Brown presided. Speeches were made by W. C. J. Hall, head of the Fire Protection Department; G. C. Piche, head of the Forestry Department; Hon. J. Bureau, attorney general of the Dominion; A. Tessier, M. P., and others.

The Association comprises 87 per cent of the timberland holders of the St. Maurice Valley, and is the largest ever formed there, representing 7,000,000 acres. The assessment is one-fourth of a cent an acre per year for protection. The Provincial Government gives $3,000 and one head inspector authorizes all rangers to aid, also pays one-third the cost of fire protection on the railroad service and one-third the cost of fire fighting. Henry Sorgino, of Montreal has been appointed manager.

Experiments in Wisconsin

With the view of developing a plan for the utilization of millions of acres of cut-over lands in Wisconsin, the United States Government has decided to make extensive experiments in forestry at the Sparta Military Reservation according to word received here today from Congressman H. J. Esch, who took up the matter with the War Department and the Department of Agriculture.

The military reservation contains 20,000 acres a large part of which is available for the experiments which are to be made immediately at the direction of W. B. Piter, supervisor of the Marquette and Michigan National Forest Association, and are to start at once. Pines from Northern Minnesota are to be planted principally.

Forester Hirst's Views

State Forester E. C. Hirst, of New Hampshire, in speaking before the Portsmouth, N. H. Y. M. C. A., recently said: "Aside from the natural conditions, New Hampshire is well situated geographically for the practice of forestry. In the middle West the timber supply is rapidly diminishing and the pine in the Southern States is being heavily cut. The Northeastern States contain large areas of natural forest land on which the eastern part of the country will more and more depend for its timber supply.

Moreover this land is situated for the most part near the large markets where the good prices secured for timber will make the practice of forestry more profitable as the years go by.

"It is about time for us to look ahead to this increasing demand for timber, protect from fire the growth we have, cut out worthless trees and make room for better ones, and plant good fast growing trees on our waste land. This is true forestry—the raising of repeated crops of timber on non-agricultural land."

Wood Products Exposition

Agitation for a Woods Products Exposition in this country this year is now being aroused by Editor Arthur Bolling Johnson, of the *Lumber World Review* of Chicago and there is every prospect that it will result in such an exposition as is desired. Detailed plans for the affair are to be proposed in a short time and in the meantime Editor Johnson is busy stiring up enthusiasm for it.

A Large Sale

The sale of 800,000,000 feet of pine, fir and cedar saw timber in the Sierra National forest along the east side of the San Joaquin Valley has been announced by the Department of Forestry and if consummated, this will be the biggest sale of timber ever operated by the Government. The Department will soon invite bids for this timber, offering contracts of twenty years in which to remove the timber, with two additional years for the construction of necessary improvements.

The announcement of the timber sale is expected to attract much interest among lumber men, as the timber is the most valuable yet offered for sale by the Government anywhere in the West. The Forestry Department is publishing an announcement of the sale, calling for bids.

Forestry Without Politics

The taking of the Forestry Service, both Dominion and Provincial, out of politics, making way for technically trained men, was advocated by G. Y. Chown, president, at the annual Canadian Forestry Convention which opened at Ottawa, recently. He also declared for a permanent forest policy, and for some efficient method of guarding against forest fires.

In an address of welcome to the delegates, Premier Borden compared Canada to a young man who had inherited a vast estate and who, unless carefully watched, was liable to squander his wealth. He especially urged the association to impress both legislators and the people with the necessity of checking the forest fire evil.

"There are some things on which the Prime Minister and myself can agree," said Sir Wilfred Laurier, "and the conservation of forests is one of these."

The Leopard Moth

The leopard moth more feared in its work of destroying trees than the brown tail and gypsy moth, has made its appearance in Waltham, Mass.

The pest has been discovered by employees of the City Forestry Department in three widely separated sections of the city.

There are two ways in which the moth may be killed. One is to spray a chemical oil into the holes where the moth has entered and block the holes up. A gas is formed which destroys the pest. The other is to use hot irons to burn the larvae.

Money for Fire Sufferers

Relatives of 32 men who lost their lives and many men who were injured while fighting fires in the Coeur d'Alene national forest near Wallace, Idaho, the summer of 1910, are sought by Roscoe Haines, suppervisor of the forest, stationed at Coeur d'Alene, Idaho, regarding the distribution of the recent appropriation by Congress for forest fire sufferers.

Few of the men, who came from various parts of the United States and Canada, and enlisted to fight fire, gave their home addresses, hence the Forest Service has been unable to get into touch with relatives of the dead and injured.

New Firm of Forest Engineers

A new firm of forest engineers has recently opened offices in Philadelphia under the name of Clark, Lyford & Sterling. The members are Judson F. Clark, of Vancouver, B. C., C. A. Lyford, of Montreal, Que., and E. A. Sterling, of Philadelphia. Mr. Clark and Mr. Lyford are also identified with the well known firms of Clark & Lyford, Vancouver, B. C., and Lyford, Clark & Lyford, Montreal, Que. Mr. Sterling has resigned his position as Forester of the Pennsylvania Railroad, which he has held for the past five years.

This organization is making a specialty of timber estimates and forest maps, and is prepared to examine and report on timber properties anywhere.

Chestnut Tree Disease

Marsden Manson, of San Francisco, Cal., writing in *Science* says: "In connection with the chestnut tree blight, I call attention to the hardy giant chinquapin of the Pacific States. This may be a resistant species adaptable to the Southern States. It occurs in two varieties, the one just mentioned and a dwarfed variety. The former reaches a height of 120 feet and has a diameter of from 8 to 10 feet; ordinarily from 40 to 55 feet in height and from 1 to 2 feet in diameter. Locality, near Willets in Mendocino County, Cal. The drawfed form is

abundant in the Cascade and Sierra Nevada and San Jacinto mountains from 2,000 to 9,000 feet. It is mostly of shrubby habit, but to all appearances identical with the giant Chinquapin. This latter is a hardy and long-lived tree of stately and handsome form. The timber is suitable for many purposes, saws readily, is fine grained and light brown. The burr and nut of both varieties are almost identical in size and appearance with the eastern chinquapin. They are difficult to obtain and are frequently attacked by a small whitish worm, the egg of which is deposited, as in the eastern chinquapin and chestnut, by a moth.

The writer suggests that the giant chinquapin be experimented with as a possible resistant species to reforest the Eastern States devastated by the chestnut tree disease. The tree would probably stand the eastern conditions south of Maryland. The shrub is extremely hardy.

Forest Eliminations Ordered

The President has signed a proclamation eliminating approximately 73,160 acres from the Jefferson National Forest, Mantana. A very careful examination made by the Forest Service had shown that the land was not chiefly valuable for forest purposes but consisted mainly of open grazing land and land of agricultural value.

The lands excluded lie mainly along the southern and eastern boundaries of the Little Belt division of the Forest. Small eliminations were also made from the Highwood Mountains, Little Rockies, and Snowy Mountains divisions.

The eliminated lands were by the same proclamation withdrawn under the Act of June 25, 1910, for classification, and will, when compatible with public interests, be restored to settlement and entry on such dates as shall be fixed by the Secretary of the Interior and after such notice as he may deem advisable.

EDUCATIONAL

Public School Instruction

That merchantable white pine can be grown in 30 years, norway pine in 35 and that a cedar swamp, lumbered to-day, will in a period of 15 years yield the same market value in commercial material as the previous cut, providing that fire does not interfere with such growths, is the information brought to the pupils of the Sault Ste. Marie, Mich., public schools recently by Deputy State Forestry Warden J. H. McGillivray, of Oscoda.

Instructors Talk

At the 27th annual meeting of the Colorado State Forestry Association at Denver recently, President Baker, of the State University, talked on "Forestry and Culture"; President Slocum, of Colorado College, on "What the Colorado School of Forestry Means to the Great West"; President Lory, of the Agricultural College, told what his institution will do for the farm by the aid of forestry, and President Snyder, of the State Normal, spoke on "The Spirit of Forestry."

Professor Ellsworth Bethel, of the East Denver High School, discussed "The Aesthetic and Educational Value of Public Parks," and urged the establishment of the office of city forester. W. W. Williamson, of Colorado Springs, discussed, "Shall the Public Domain With the National Forests, Be Turned Over to the State?"

Dean Toumey's Views

Dean Toumey, of the Yale Forestry School, in addressing the graduates recently, said:

"During the past two years many students in American forestry schools and possibly some of you, have become more or less pessimistic, not so much because of the lack of faith in the future of American forestry, but because of the belief that there is a danger that the profession will become overcrowded, and opportunity for responsible work and advancement curtailed.

"During the decade ending with 1910 every man, good, bad and indifferent found a position awaiting him on the completion of his professional training. Many of these positions have been retained by men who will not be able to retain them in the future. The weeding out process in professional forestry in this country has already begun and who will deny that this is a splendid thing for the profession. Weeding out carries with it no fear for the competent man. You need have no fear of the overcrowding of the profession at the top. There are now and always will be shown by your own work that you are the best men to fill them.

Forestry at Cornell

If the approval of the trustees is forthcoming Cornell will soon have a course in forestry leading to the regular baccalaureate degree at the end of the fourth year and to the degree of master in forestry at the end of the fifth year. The university faculty has recommended this action and asked the trustees to establish the new degree.

Details of the course have not been worked out, but the entrance requirements will be the same as those for the course in agriculture. The first two years will be similar to those of the present course in agriculture except that solid geometry and trigonometry will be required if they have not been offered for entrance. In the junior year work in general science will be continued, supplemented by some surveying in the College of

Civil Engineering and the beginning of work in technical forestry. The fourth and fifth years will be devoted mainly to work in forestry, with some work in engineering.

Seeking Information

J. P. Wentling, assistant professor of forestry in the agricultural department of the State University of Minnesota, has written County Superintendent Boerger asking him to appoint two observers of forestry in Stearns County. The idea of the department is to have at least two of these observers in each county of the State to report on the time of leafing, blossoming and fruiting of the various kinds of trees.

The department is starting out to secure as nearly exact data concerning the trees of the State as is possible. Competent observers, whether teachers of botany or persons well posted in botany are required for the work.

Chances for Several States

Provided a bill is passed which is now pending in the United States Senate, asking that five per centum of the gross receipts from national forests during any fiscal year, beginning June 30, 1912, shall be available for the purpose of maintaining a school of forestry in the States in which national forests are located, several States will have a school of forestry, to be part of the curriculum of studies of some State institutions.

Students' Experiences

That the young foresters of Oregon Agricultural College can live on their own cooking and conduct a regulation foresters' camp, has been demonstrated by Professor Peavy, head of the school of forestry, who with the ten members of his class in forest mensuration has been passing the last four days in cruising a 640-acre tract of timber in the hills west of Philomath. The boys made a careful study of the forest conditions existing in that type of region, relative to the availability of the timber for lumbering purposes, and were incidentally introduced to the canthook, measuring stick and calipers and taught their uses.

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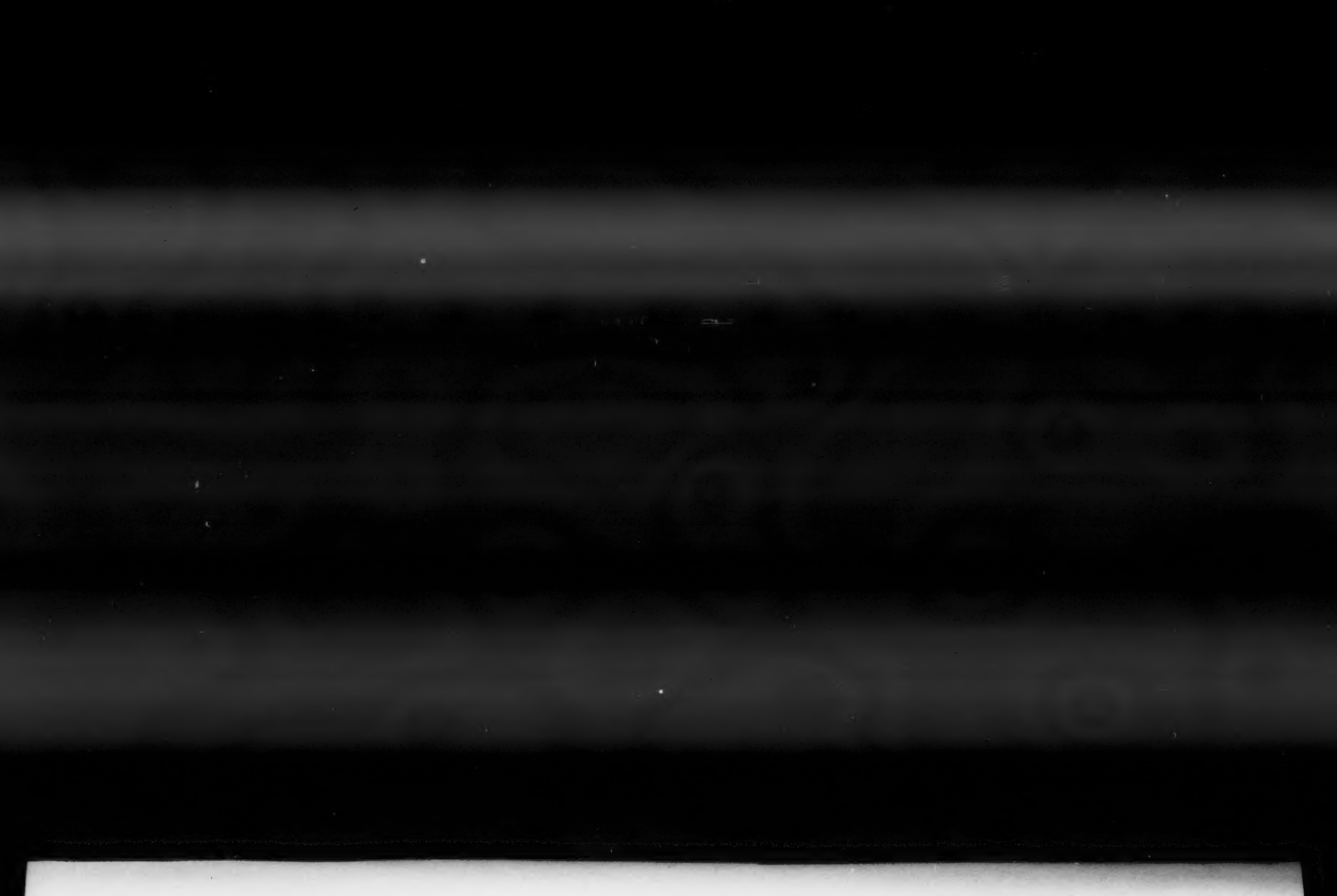
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